PB86-106614

Draft Environmental Impact Statement for Metropolitan Seattle. Volume 2
West Point, King County, Washington

(U.S.) Environmental Protection Agency
Seattle, WA

Sep 77

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO. EPA 910/9-77-043B

2.

3. Recipient's Accession No. PB8 6 106614/AS

4. Title and Subtitle
Draft Environmental Impact Statement for Metropolitan Seattle
Volume II West Point

5. Report Date August 1977

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

U.S. Environmental Protection AGency Region 10
1200 6th Avenue
Seattle, WA 98101

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The West Point wastewater treatment plant is one of five Metro treatment plants that will be affected by the wastewater management alternatives being considered in the 201 Facility Plan. This report, Volume II, presents the impacts of the eight treatment alternatives on the WEst Point plant site and service areas. Impacts of the alternatives on the regional level and a background of the regional issues are discussed in Volume I. Three other site documents, Alki, Carkeek Park, and Richmond Beach are also included in the Volume II series.

17. Document Analysis a. Descriptors

Environmental Impact Statements
Wastewater Treatment

b. Identifiers/Open-Ended Terms

West Point, Washington

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report)

20. Security Class (This Page)

21. No. of Pages

22. Price

(See ANSI–Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4–77)
(Formerly NTIS–35)
Department of Commerce

EPA 910/9-77-0438

WA #9

EPA-10-WA-KING-SEA-WWTW-77

PB86-106614

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
SEPTEMBER 1977

METROPOLITAN SEATTLE

WEST POINT
VOLUME II
KING COUNTY, WASHINGTON

3446

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X, SEATTLE, WASHINGTON

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR
METROPOLITAN SEATTLE

Volume II

West Point

Number: EPA 910/9-77-043 B
King County, Washington

Prepared jointly by:
Environmental Protection Agency,
Region X
Seattle, Washington 98101

Municipality of Metropolitan Seattle
Seattle, Washington

Washington State Department of Ecology
Olympia, Washington

With the Assistance of

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Approved by:

Donald P. Dubois
Regional Administrator

August 25, 1977
Date

INTRODUCTION

A. Action Sponsor

The action sponsor is the Municipality of Metropolitan Seattle (METRO) for purposes of compliance with the State Environmental Policy Act (SEPA RCW 43.210) and the Federal Environmental Protection Agency for the purposes of compliance with the National Environmental Policy Act (NEPA).

B. Lead Agency, Responsible Official and Contact Person

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King County
Puget Sound Council of Governments

Consultants: James M. Montgomery, Consulting Engineers, Inc. (Environmental Impact Statement)
Metropolitan Engineers (Facility Plan)
Human Resources Planning Institute (Socio-economic studies)

D. Licenses and Permits Required to Implement Wastewater Facilities Plan

Building, grading, complex source permit, shoreline permit and other local governmental permits would be required before implementing most of the alternatives described herein. Eligibility for grant funding by EPA and DOE would be determined after completion of the Final Facility Plan and EIS.

E. Location of EIS Background Data

Municipality of Metropolitan Seattle
Environmental Planning Division
SEPA Information Center
Room 404
600 First Avenue
Seattle, Washington 98104

F. Cost to Public for a Copy of the EIS

No charge while supply lasts.

G. Date of Issue of Draft EIS

This Draft Environmental Impact Statement was made available to the Council on Environmental Quality (CEQ) and the Public on September 23, 1977.

H. Final Due Date for Public and Agency Comments

The final date for submittal of public and agency comments is November 11, 1977. All comments should be sent to Mr. Roger K. Mochnick, Environmental Evaluation Branch, Environmental Protection Agency, 1200 Sixth Avenue, Seattle, WA 98101.

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    City Council Central Staff
    Environmental Review Committee
    Department of Community Development
    Office of Policy Planning
    Department of Parks and Recreation
    Department of Engineering
    Department of Public Works
    Water Department
Port of Seattle, Director of Planning

County Agencies:

    Administrator, King County
    Seattle - King County Department of Health
    Department of Budget & Program Planning
    Department of Planning & Community Development
    Department of Public Works

Puget Sound Council of Governments
Snohomish Metropolitan Municipal Corporation-King County (SNOMET)
Puget Sound Air Pollution Control Agency
Chairperson, Citizen's Water Quality Advisory Committee
Chairperson, Metropolitan Sewer Advisory Committee
City of Renton
City of Edmonds
City of Lynwood
City of Black Diamond
Metro's component and contracted agencies
National Wildlife Federation
Friends of the Earth
Sierra Club
Audubon Society
Washington Environmental Council
Institute of Environmental Studies (University of Washington)
Ecotope Group

This Draft Environmental Impact Statement was made available to the Council on Environmental Quality (CEQ) and the public on September 23, 1977.

SUMMARY OF DRAFT EIS CONTENTS

The Draft EIS is summarized in terms of the proposal, the alternatives considered, the direct and indirect impacts on the environment, mitigation measures and mitigating measures to eliminate adverse impacts.

The Proposal

Metropolitan Engineers, a consultant to the Municipality of Metropolitan Seattle has prepared a Draft Facility Plan for Puget Sound Plants to the year 2005. Alternatives in the Draft Facility Plan are focused on facilities at West Point, Alki, Carkeek Park, and Richmond Beach, but other sites within these designated service areas have been considered as options. The Metro plant at Renton is not included in the proposed facilities, but effects of alternatives on Renton are described since Renton is an integral part of the Metro system.

This Draft EIS summarizes the impacts of the alternatives for the West Point plant and service area as well as alternative sites in Interbay.

Regional Alternatives

The eight regional alternatives are summarized below, particularly as they would affect the West Point Plant.

The Draft EIS analyzes the impacts of the eight regional alternatives proposed in the Draft Facility Plan. Each alternative is evaluated on a co-equal basis in the Draft; no recommended alternative has been selected.

Regional alternatives were developed to address, in various combinations, four polar issues: water quality, site impacts, the law (PL 92-500) and costs. Components considered in developing alternatives included service area, collection system and transfer interceptors, treatment process, plant site, treated wastewater discharge location, combined sewer overflow control, and sludge management. Interceptors to serve new growth areas were not included.

Two of the alternatives (A and B) are "no action" alternatives required by SEPA and NEPA. Two of the alternatives (C and D) address combined sewer overflows, a local water quality problem. Four alternatives (E, F, G and H) provide secondary treatment and other variable features. From the eight regional alternatives, it is possible to derive hybrid alternatives that select components from more than one alternative and blend them into a new alternative, such as secondary treatment plus combined sewer overflow control.

Alternative A - No Action

No capital expenditure would be made for expansion, modification or upgrading of treatment plants and no construction of new interceptors during the planning period (until 2005). Alternative A is evaluated to meet SEPA "no action" requirements.

West Point would continue to serve the existing sewered population in the present service area. Primary treatment for 104 mgd average dry weather flow/350 mgd peak would be provided to wastewater prior to discharge to Puget Sound. West Point would continue as the regional sludge processing center. No new structures would be built at the plant site.

Alternative B - Metro Comprehensive Plan (No Action Pursuant to PL 92-500)

Plant upgrading and transfer interceptor construction would be done according to the Metro Comprehensive Plan. Alternative B is evaluated as the "no action" alternative pursuant to PL 92-500 and NEPA requirements and serves as the baseline for other alternatives. Puget Sound plants (West Point, Alki,Carkeek Park and Richmond Beach) would be retained with primary treatment. Improved sludge management and disinfection practices would be provided in Alternative B and all following alternatives. Four new transfer interceptors and improvements to the Alki outfall would be included.

In Alternative B, West Point would serve population growth to 2005, but in a smaller designated Seattle area than Alternative B. Primary treatment of 142 mgd average 350 mgd peak flow would be provided prior to discharge to Puget Sound. Additional sludge digestors would be constructed to handle increased solids loads.

Summary of Draft EIS Contents

Alternative C - Major Combined Sewer Overflow Control

Major portions of combined sewer overflows would be controlled by transfer from fresh to saltwater and/or treatment. The existing Puget Sound Plants would be upgraded to provide enhanced primary treatment by physical/chemical treatment of solids during the summer. A new wet weather enhanced primary treatment plant would be constructed in the lower Duwamish industrial area and the Alki plant would be abandoned, both in 1995.

At West Point, the plant would be upgraded to advanced primary treatment by 1985. The service area would be reduced relative to Alternative B, so average capacities of 139 mgd, wet weather 350 mgd would be provided. Construction of two new digesters, chemical storage and feed buildings, and filter press would complete the minor site modifications. Sludge from Richmond Beach, the new Duwamish plant and West Point would be handled at West Point.

Alternative D - Partial Combined Sewer Overflow Control

Wet weather combined sewer overflows would be reduced to Lake Washington, Lake Union and the West Seattle shoreline. The four Puget Sound plants would be upgraded to enhanced primary treatment with chemical addition during the summer for improved solids removal.

The West Point site modifications would be the same as in Alternative C. Changes in service area would result in 129 mgd average/350 mgd peak flows.

Alternative E - Secondary

Secondary treatment would be added to the West Point, Alki and Richmond Beach wastewater treatment plants by 1985. The Carkeek Park plant would provide primary treatment for wet weather flows only beginning in 1985; dry weather flows would be pumped to West Point.

Serving the same population and service area as Alternative B, plus the addition of Carkeek Park dry weather flows, the West Point Plant would provide secondary air activated sludge treatment to 142 mgd average, 350 mgd peak flows.

Sludge from West Point and Richmond Beach would be treated at West Point. Additional facilities at the site would be secondary aeration tanks and clarifiers, and new digesters. Twelve acres of shoreline fill would be required for this proposal.

Alternative F - Secondary/Southern Strategy

Secondary treatment would be provided at Richmond Beach and West Point (with a reduced service area). A major new secondary treatment facility would be constructed in the Duwamish industrial area in 1985; the Alki plant would be abandoned at that time. A new outfall off Alki Point would be built for discharging effluent from the Duwamish (and Renton) plants. The Carkeek Park plant would provide primary treatment for wet weather flow only beginning in 1985; dry weather flows would be pumped to West Point.

The West Point secondary plant would treat 97 mgd average, 350 mgd peak flows. With this reduction in capacity relative to Alternative B, the oxygen activated sludge secondary process could be accommodated at the existing site with no shoreline fill required.

Additional facilities would include secondary aeration tanks and clarifiers, cryogenic (low temperature) oxygen facilities and a filter press.

Alternative G - Secondary/West Point Phaseout Option

Secondary treatment would be provided at the Alki and Richmond Beach plants. West Point would continue as a primary treatment plant for wet weather flows only, beginning in 1985. A new secondary treatment plant in the Interbay area (Commodore Way or Golf Park sites) would be constructed. The Carkeek Park plant would provide primary treatment for wet weather flows only beginning in 1985; dry weather flows would be pumped to West Point.

The West Point plant would appear as it does under existing conditions for its function as a wet weather primary treatment plant. The new Interbay plant would treat 150 mgd average, 200 mgd peak flows by secondary treatment for discharge through the West Point outfill in dry weather and through a new Elliott Bay outfall in wet weather. Approximately 33 acres would be required in the Interbay area. The proposed site is the Golf Park /Garbage Dump; Commodore Way is an optional site.

Alternative H - Deconsolidation/Reclamation

Secondary treatment would be provided at West Point, Alki, Carkeek Park and Richmond Beach. Areas of growth would be served by new inland plants with local effluent and sludge re-use possible. Advanced waste treatment would be provided at new North and South Lake Sammamish plants. A new secondary plant at Kenmore would discharge treated effluent to Puget Sound.

The West Point plant would treat 121 mgd average, 350 mgd peak flows by the secondary, air activated sludge process. Twelve acres of shoreline fill would be required to accommodate new secondary aeration tanks, clarifiers and sludge digesters.

Environmental Impacts

The primary (direct) and secondary (indirect) impacts of each alternative are described by categories in the physical, biological and human environments plus natural resources and energy. A summary of the major effects of each alternative is described below.

Alternative A (No Action)

Alternative A, which would continue sewerage service to the present sewered population but provide no new service or capital improvements, would have comparable impacts in 2005 as existing conditions. Combined sewer overflows would produce localized adverse impacts on inland surface waters (Lake Washington, Portage Bay, Lake Union, Ship Canal) plus at Elliott Bay and Alki Point. Pollutant discharge to Lake Washington/Ship Canal from CSO's would have adverse impacts on fisheries. In Puget Sound, the discharge of solids, metals, toxicants and other materials would continue at present rates. Although effects as measured to date from present discharges have been very minor, the possibility of subtle, long-term impacts must be considered.

The site impacts on regional parklands or residential areas would continue. The West Point plant would continue operating near Discovery Park and would continue to be visible from residences along the bluffs. Odor at these residences would not be a problem due to dispersal. Sludge truck traffic would double.

The Alternative would not comply with PL 92-500. No Shoreline Management Act permits would be needed.

Alternative B -(Metro Comprehensive Plan-No Action Pursuant to PL 92-500)

Water quality impacts would increase under Alternative B relative to existing conditions. CSO flow increases of 20 to 40 percent would present localized adverse water quality impacts in the inland surface waters (Lake Washington and Ship Canal) used by migratory fish. Construction of the second Kenmore interceptor could possibly adversely affect salmon spawning areas in a portion of Lake Washington. In Puget Sound, discharge of primary effluent would add more materials than presently that could adversely affect water quality, such as solids, oxygen-demanding materials, bacteria, nutrients and toxicants. Long-term impacts of this discharge are difficult to ascertain, based on limited data, but could be detrimental to Puget Sound.

The site impacts would be approximately the same as in Alternative A, since only minor improvements would be made by adding digesters. Recreational uses at the adjacent West Point beaches would be limited.

This alternative does not comply with the secondary treatment requirements of PL 92-500, and is evaluated only to comply with NEPA "no action" requirements and to recognize Metro's present Comprehensive Plan.

Alternative C - (Major Combined Sewer Overflow Control)

This alternative would virtually eliminate CSO's to Lake Washington, Lake Union, Portage Bay and the Ship Canal. Localized moderate to major benefits to migratory fish routes and spawning areas would result. In Puget Sound, enhanced primary treatment would result in a 20 percent reduction in solids loads relative to Alternative B, but an increase over existing conditions, so water quality improvements due to Metro discharge are not anticipated therein.

Because no substantial changes would be made at the treatment plants, West Point recreational uses near the site and at Discovery Park would not be changed.

Alternative C does not comply with the PL 92-500 requirements for secondary treatment as currently written.

Alternative D - (Partial Combined Sewer Overflow Control)

Substantial decreases in CSO's to sensitive freshwaters would result. Lake Washington, in particular, would benefit in localized areas from CSO reductions of approximately 75 percent. This was judged as a moderate benefit to salmon spawning areas. A fifty percent CSO decrease to the Ship Canal should benefit migrating fish. Discharge to Puget Sound would be approximately equivalent to Alternative C, wherein water quality improvements were not anticipated due to increases in wastewater flows and loads.

The West Point site would appear similar to its present condition. As such, it would limit beach use and could be visible to users of Discovery Park. Odors in nearby neighborhoods would not be a problem since dispersal is adequate and there are no residents in the immediate area. Sludge truck trips through the park would be seven trips per day less than in Alternative B.

Alternative E - (Secondary)

Secondary treatment would reduce the solids loads (and corresponding metals, oxygen-demanding materials, toxicants, and other contaminants) to Puget Sound by approximately 75 percent compared to Alternative B. Although the exact impacts of this reduction are not known, it appears to be beneficial from the standpoint of subtle, long-term effects. However, nutrients would probably increase in Puget Sound which could affect the size of plankton blooms. In addition, this alternative makes no change in CSO's, which could have localized adverse effects on salmon spawning and beach areas in Lake Washington, plus migratory fish routes in the Ship Canal. Constructing the Kenmore parallel interceptor could destroy salmon spawning areas in part of Lake Washington by siltation.

The site impacts would include 12 acres of shoreline fill needed at West Point to accommodate the air activated sludge aeration basin and clarifiers. A shoreline management permit would be required and could be granted if there were no other feasible alternative. Odors could increase at the site, but covering the clarifiers would help alleviate impacts. Use of the West Point beaches would be limited by the new facilities, which could be viewed from Discovery Park.

Alternative F - (Secondary/Southern Strategy)

The discharge through the West Point outfall would result in over 80 percent reduction in solids loads from West Point to Puget Sound, primarily because flow from the existing southern service area would be routed to the new Duwamish plant and discharged through a new Alki outfall. Although the extent of existing information makes it difficult to quantify the benefit from water quality improvement, subtle long-term improvements would be expected with the smaller load of solids, BOD, toxicants, metals and others.

Alternative F would also reduce CSO's to inland waters in the West Point service area by about 30 percent, a minor improvement to fish spawning areas and migratory routes.

The site impacts at West Point would not be so extensive as Alternative E, because the oxygen activated sludge treatment facilities could be accommodated on the existing site. The cryogenic facilities associated with oxygen production would be tall and more visible than other structures when viewed from off the site. Occasional noise could be associated with the oxygen facilities, which also would have more potential risks than air activated sludge in being more explosive. Based on experience from similar facilities, this risk appears to be negligible. The sludge truck traffic would be half that of Alternative B.

Alternative G - (Secondary/West Point Phaseout Option)

The water quality impacts on Puget Sound from effluent discharge would be similar to Alternative E because service areas, flow and treatment processes would be the same. Some impacts on Elliott Bay from the Interbay outfall could be expected. Effects of CSO's on freshwater would also be the same as in Alternative E. The construction of the Kenmore parallel would destroy some salmon spawning areas by siltation. Site impacts at Interbay would be significant. If the Golf Course site were used for the Interbay plants, local residents would be affected by odors during construction and operation and a recreational facility would be displaced. The construction suitability at the Golf Course site is questionable. If the optional Commodore Way site were selected, approximately 60 businesses would be displaced, with the transfer of 700-800 jobs.

At West Point, the site would appear as it does now. Because it would be used as a wet weather only plant, sludge truck trips would average less than one per day, the lowest number of all alternatives.

Alternative H - (Deconsolidation/Reclamation)

Water quality and related biological benefits from CSO reduction under Alternative H would be small; thus, localized spawning or recreational areas along Lake Washington and migratory fish routes through Lake Union would be affected. Impacts on overall quality of Puget Sound would be similar to other secondary alternatives, an anticipated but not quantitative improvement.

Site impacts at West Point would be similar to Alternative E, since twelve acres of shoreline fill would be required. Impacts on beach use would be substantial. Odors could increase at the site, but not to the extent that they would be noticeable to the nearest residents. Sludge truck traffic would be less than 5 trips per day.

Mitigation Measures

Some measures which could mitigate adverse impacts are as follows:

1. Operating enhanced primary treatment year round (Alternatives C and D).
2. Improving chlorination application systems (Alternatives B, C, D).
3. Monitoring water quality, biology and currents to obtain more information prior to constructing new outfalls at Elliott Bay (Alternatives C,D & G).

4. Improved industrial pretreatment under pending, stricter standards for West Point and/or Interbay service areas.

5. Investigation of transfer options other than the Kenmore parallel (Alternatives B, E, G).

6. Options for landscaping and recreational facilities at the West Point site, such as vegetation to screen views of the plant from Discovery Park, berm plantings to improve the aesthetics as viewed from Puget Sound, removing the sludge lagoon on the South Beach, and/or providing promenades (Alternatives B, C, D, E, F, G, and H).

7. Further evaluation of measures to eliminate shoreline fill, such as tall aeration basins or stacked clarifiers (Alternative E and H).

Unavoidable Adverse Impacts

The remaining impacts on water quality, biology, socioeconomics, sites, costs, energy and natural resources that could not be mitigated by the previously mentioned measures under each alternative would be unavoidable adverse impacts.

DESCRIPTION OF THE PROPOSAL

A. Name of the Proposal and Sponsors

This information is contained in the Introduction and in the Summary of Draft EIS Contents

B. Location of the Project

The project location is described in Chapters I and III of the Draft EIS.

C. Other Agencies File Numbers on Proposal

The reader is requested to contact Mr. Roger Mochnick (EPA), Mr. John McDonnell (DOE), and Dr. Peter Machno (Metro) for this information.

D. Identification of Construction Phasing and Future EIS Requirements.

Chapter III contains this information.

E. Description of Physical and Engineering Aspects of the Project

Projects are summarized in the Draft EIS and detailed in the Draft Facility Plan.

F. Land Use Plans and Zoning Regulations

Chapter II of the Draft EIS describes existing and projected land use; Chapter III addresses whether the proposal is consistent with these regulations.

PREFACE

This Draft Environmental Impact Statement (EIS) evaluates the impacts of alternative wastewater facilities described in the Draft Facility Plan developed for the Municipality of Metropolitan Seattle (Metro). The alternatives include wastewater treatment plants, transfer interceptor sewers, combined sewer overflow control facilities and sludge handling facilities that would be constructed and operated by Metro. The major part of construction costs could be provided by grants from the Environmental Protection Agency (EPA) and the Washington State Department of Ecology (DOE).

The EIS has been prepared in response to federal and state legislation plus local resolutions requiring that EPA, DOE and Metro each fully consider the environmental impacts and consequences of alternative projects prior to making a final decision to proceed on a recommended project. The respective responsibilities for the three agencies in the EIS process were established for EPA in the National Environmental Policy Act (NEPA), 42 U. S. C. Sec. 4321, et seq.; for DOE in the Washington State Environmental Policy Act (SEPA) Chapter 43.21C RCW; and for Metro in Metro Council Resolution No. 2582.

In certain cases, significant environmental impacts could result from the various wastewater facilities alternatives. For example, alternatives for Metro's West Point, Alki and Carkeek Park wastewater treatment plants may have significant environmental impacts; similarly an evaluation of facilities on a regional level indicated that some significant impacts should be considered. Therefore, a decision was made to prepare an EIS on these projects to comply with both NEPA and SEPA requirements. Rather than preparing separate EIS documents at the appropriate time, the three agencies agreed to prepare a joint EIS for the regional facilities alternatives, plus the West Point, Alki and Carkeek Park alternatives. In addition to satisfying both NEPA and SEPA with the joint EIS, the agencies also chose a procedure designed to eliminate delays and duplication of effort as well as to facilitate desirable interchange among the agencies and with the public during the early stages of the EIS process.

In another case facilities would not cause significant environmental impacts as defined in NEPA. Therefore, an EIS pursuant to SEPA (which would also serve as an environmental assessment) was prepared for the Richmond Beach site and service area.

Preface

For the total evaluation of the environmental impacts of alternative facilities plans, the environmental analysis has been organized as follows: Regional Analysis EIS (Volume I), West Point Treatment Plant EIS (Volume II), Alki Treatment Plant EIS (Volume II), Carkeek Park Treatment Plant EIS (Volume II, Richmond Beach Treatment Plant EIS (pursuant to SEPA) (Volume II). Each site-specific document (Volume II) is intended to be read with the regional analysis (Volume I), with each such pair constituting a complete EIS.

The production of this joint Draft EIS results from close cooperation between EPA, DOE, and Metro. All three agencies have been intimately involved with the review, analysis, supplementation, and synthesis of materials furnished by independent consultants hired to assist with the preparation of the EIS. The City of Seattle, King County, and the Puget Sound Council of Governments have also participated in meetings and provided comments on preliminary draft materials to ensure that local government concerns and regional land use planning goals were incorporated in the EIS.

EPA regulations on "Preparation of Environmental Impact Statements" (40 CFR Part 6; 40 FR, April 14, 1975), Council on Environmental Quality Guidelines for the "Preparation of Environmental Impact Statements" (40 CFR Part 1500; 38 FR 20550, August 1, 1973), and the EPA "Manual for Preparation Works, Facilities Plans, and 208 Area-wide Treatment Management Plans" (July 1974) have been used in preparation of the EIS. Likewise, SEPA Guidelines, adopted by the State Council on Environmental Quality and incorporated by Metropolitan Council Resolution No. 2582, have been followed insofar as they are consistent with federal requirements.

Some of the alternatives described in the Draft EIS's and Draft Facility Plans include the provision for secondary treatment at Metro facilities by 1985. The twenty year planning period is from 1985-2005. These 1985 dates are not consistent with the current PL 92-500 requirement for Best Practicable Treatment including secondary treatment by 1983. According to the facility planning engineers, the 1985 date may be more realistic than 1983 due to delays in the Step I planning process, and thus in the start dates for Step II (design) and Step III (construction).

However, since the law currently requires Best Practicable Treatment by 1983 the construction schedules will be changed to reflect this. Due to time constraints it was not possible to change the dates in the Draft Plans and EIS's. The reader should note that any mention of secondary treatment in 1985 will be changed to 1983 in the Final Plans and EIS's. The twenty year planning period also changes to 1983-2003.

These changes may impact the analysis of alternatives in several minor ways. First there is a potential for a slight saving in costs, due to the decrease in inflation associated with an earlier start date. However, the need for this earlier start date compresses the design and construction schedules causing an increase in these costs. The two factors, one a potential savings and one in increase in costs, will probably negate one another.

The new planning period from 1983-2003 will cause population projections and solids loading to decrease slightly. This decrease, estimated at 2 percent, is well within current sensitivity of the projections and should not have a noticeable impact on the analysis.

All comments on this Draft EIS should be sent to the EPA as the lead agency in the EIS process. Comments should be addressed to Mr. Roger Mochnick, Environmental Evaluation Branch, Environmental Protection Agency, 1200 Sixth Avenue, Seattle, Washington, 98101. The EPA will then distribute copies of the comments to DOE, Metro and the EIS consultant. Comments will be used by the three agencies in preparing the Final EIS and in their decision-making processes.

It is believed that this process best enables the agencies involved to fully assess and consider all significant physical, economic, and social effects of their proposal, and public input thereon, prior to any significant decision-making step. For this reason, the agencies have not attempted to bias the decision to be reached by recommending any one of the eight alternatives prior to full completion of the EIS process, including the public hearings. Rather, the attempt of this document is to present the decision makers and the public with as complete an analysis as possible of each of the alternatives so that a fully informed decision can be made.

The remaining part of the decision-making process will proceed under the following schedule:

October 25, 1977	Public hearings on Regional Draft EIS
October 26, 1977	Public hearings on West Point Draft EIS
November 1977	A preferred alternative is recommended by Metro in conjunction with EPA and DOE
February 1978	Final EIS is available
March 1978	Public hearings on Final EIS
April 1978	Metro Council decision

Preface

April 1978	DOE decision
April 1978	EPA decision

CHAPTER I

BACKGROUND

The West Point wastewater treatment plant is one of five Metro treatment plants that will be affected by the wastewater management alternatives being considered in the 201 Facility Plan. Figure 1-1 shows the treatment plants' location and the service area tributary to each. This report,Volume II, presents the impacts of the eight treatment alternatives on the West Point plant site and service areas. Impacts of the alternatives on the regional level and a background of the regional issues are discussed in Volume I. Three other site documents, Alki, Carkeek Park, and Richmond Beach are also included in the Volume II series.

The West Point treatment plant serves much of Seattle's more developed sections and includes approximately 59,000 acres of Lake Union, Elliott Bay, Southwest Lake Washington, Northwest Lake Washington, and North Lake Sammamish subareas. The service area includes also those additional areas which are projected to be sewered by 2005. The collection system conveys storm water as well as domestic and industrial wastewaters. High flows are experienced at the plant during and following storms depending on the duration and intensity of the storm.

The primary treatment plant at West Point was constructed during 1962-1966 at a capital cost of $12,900,000. Operations began in 1966. It is the largest of the five Metro treatment plants. The plant is designed for an average dry weather flow of 125 million gallons per day (mgd) and a peak wet weather flow of 350 mgd. Present average dry weather flow reaching the plant ranges between 75 to 90 mgd which is within the design limit; however, the peak wet weather flows are reported to reach the design capacity of the plant. The final effluent is discharged to Puget Sound through a submarine outfall which terminates in a 600 foot long multi-port diffuser under 240 feet of water approximately 3,500 feet from shore. Sludge produced at the other Metro treatment plants, except Alki, is transferred to West Point where it is further digested and dewatered before being hauled away to Cedar Hills landfill

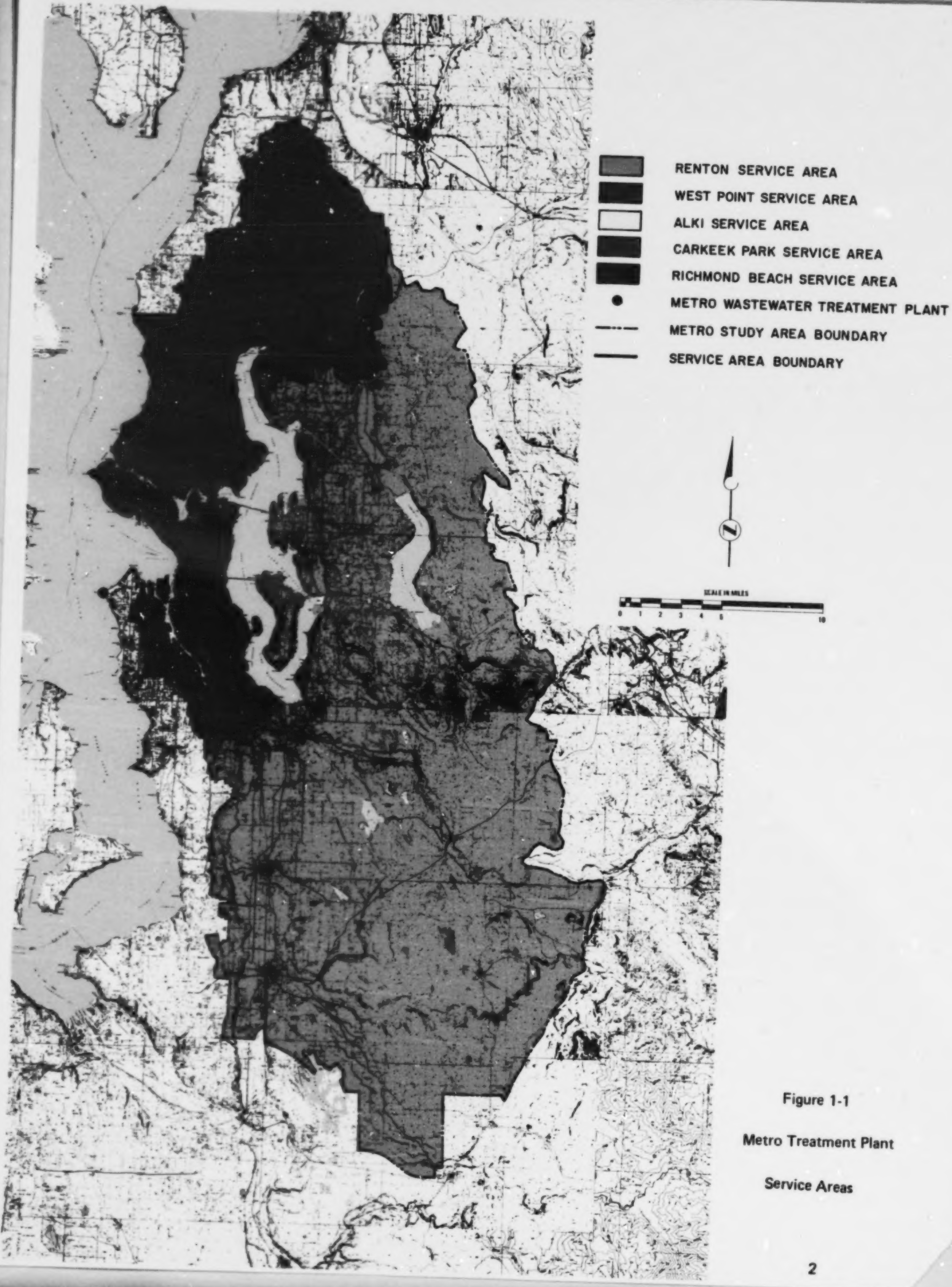
RENTON SERVICE AREA
WEST POINT SERVICE AREA
ALKI SERVICE AREA
CARKEEK PARK SERVICE AREA
RICHMOND BEACH SERVICE AREA
● METRO WASTEWATER TREATMENT PLANT
METRO STUDY AREA BOUNDARY
SERVICE AREA BOUNDARY
N
SCALE IN MILES
0
1
2
3
4
5
10

Figure 1-1

Metro Treatment Plant

Service Areas

and for recycling to the University of Washington's Pack Forest Demonstration Project.

Metro owns approximately 80 acres of land at the West Point site, some of which is subtidal. At the present, the plant occupies approximately 24 acres of the site. It is staffed with 47 plant operations and maintenance personnel. Operating cost is approximately $2.8 million/year. Traffic generated by the plant operations amounts to 50 round trips per day including 7.3 round trips/day for sludge trucks.

More detailed description of the service area and treatment facility is included in Chapter III under the No Action alternative.

SITE CONSTRAINTS AND ISSUES

The West Point treatment plant is located in an environmentally sensitive area between a regional park and the waters of Puget Sound. An aerial view of West Point is shown in Figure 1-2. There are two historic sites and an unstable hillside near the plant. Expansion to secondary treatment as mandated by PL 92-500 would require creating by landfill or purchasing from the park as much as 12 acres of land. The shoreline fill (landfill) would require a shoreline management permit, which could be difficult to obtain. Under the provisions of the City of Seattle Shorelines Master Program, which was adopted by the City Council and approved by DOE in June 1976, much of West Point was designated as Conservancy Management with the beach as Conservancy Natural. The program does not prohibit but discourages future location of new sewage treatment facilities and the expansion of the existing treatment facility at West Point. Furthermore it provides that only when no feasible alternative exists can a shoreline site be considered for these purposes. Questions have been raised over the definition of "feasible alternative" and whether the federal law which requires expansion of the site and landfill under PL 92-500 may override local and state laws. These issues, once resolved, will have a definite impact on the selection of the alternatives for West Point.

Increased sludge quantities due to upgrading the treatment to secondary and increased flows would increase sludge hauling traffic and impair the aesthetics of Discovery Park and Fort Lawton, important Seattle-King County natural and cultural resources (see Appendix E, Regional Analysis). Neither noise nor odors are major problems at West Point due to prevailing winds and buffering zones which dispel poten-

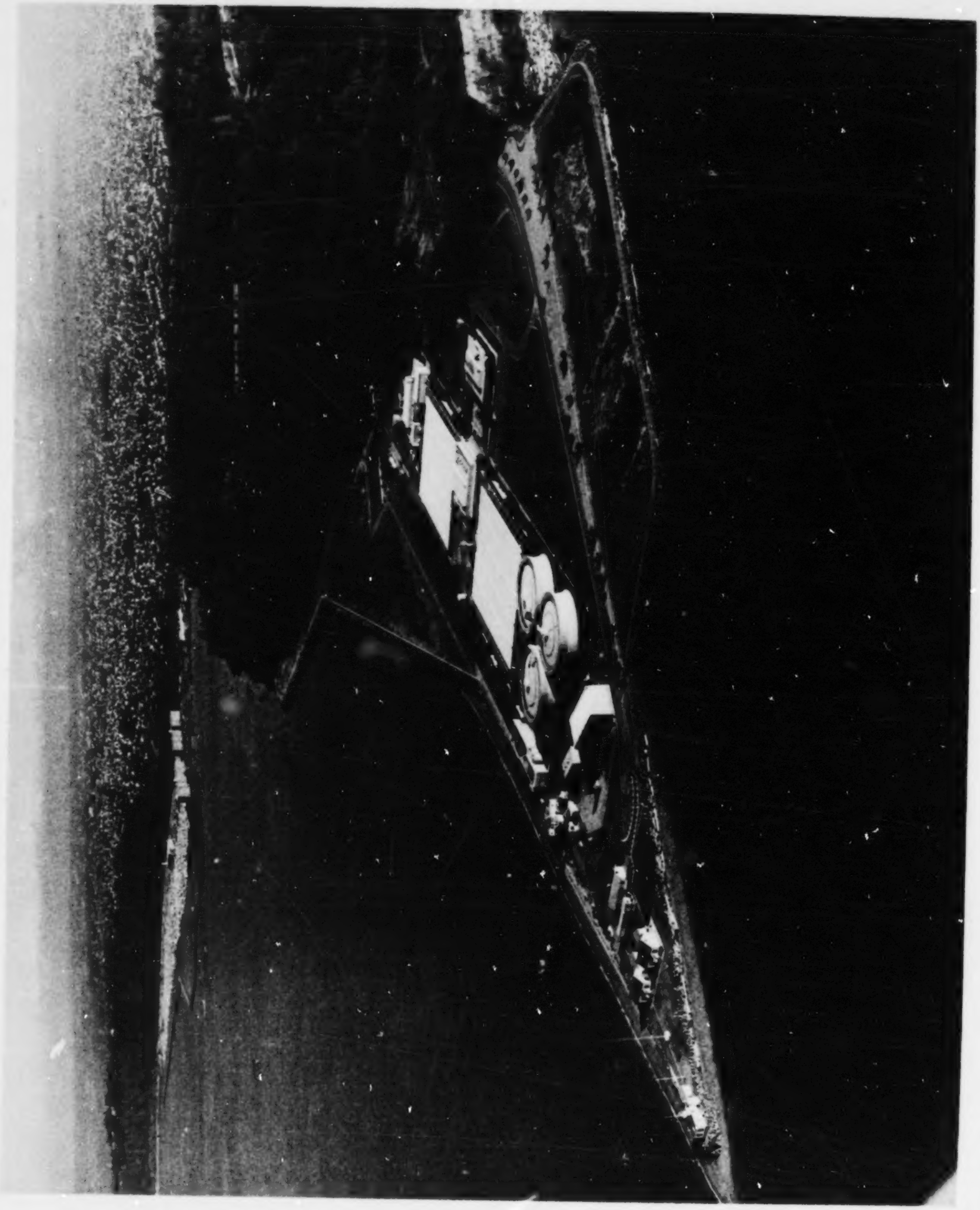

Figure 1-2
Aerial View of West Point — — Looking Northeast

tial nuisances. Odors are usually blown offshore or away from residences which are not close to West Point.

Because the use of the West Point site is severely restricted, other alternative sites to accommodate expansion have been considered. Initially, eight alternative sites were identified in the West Point service area, however, two possible sites in the moderately industrial Interbay area were finally selected for further study, Commodore Way and an old garbage dump, now a golf course, Figure 1-3. Construction at the Commodore Way site would involve displacing light industry, an expensive proposition. The structures, whether at Commodore Way or the Golf Park, would be aesthetically offensive, and odors could be a problem as there is poor air circulation at both areas. Furthermore, the substrate at the Golf Park is judged to be structurally unsound and would necessitate extensive excavation and foundation support. The Golf Park site has been used for costs in the Draft Facility Plan, but both are evaluated in the EIS.

The possibility of returning West Point to a natural beach setting or at least mitigating site impacts by landscaping is an important issue to the Park Board. Certain landscaping measures and potential for ultimate phaseout have been considered in the facilities plan and may benefit Discovery Park.

At public workshops and community meetings concerning West Point, a definite controversy arose over the future of the West Point plant. Some people living in neighborhoods near the plant favored relocation, or, at least, no expansion. Other residents would prefer not to have two major wastewater facilities (West Point and Interbay) nearby. Commodore Way area residents would prefer keeping the plant at its present location and expressed their concern for the condemnation, relocation, and tax loss costs associated with construction at Commodore Way, warning that odors from either Interbay site would annoy residents of Magnolia, Queen Anne, Ballard, and Phinney Ridge neighborhoods. The importance of the tourist value of the fishing fleet to Seattle's economy and the need to keep water quality in the canal locks near Commodore Way high enough for salmon runs were also pointed out.

Other issues that were raised relative to plant expansion/relocation included the need for a social survey for Commodore Way and Golf Park sites, competing uses of Discovery Park, economic and recreational values of the fishing industry, the number of people affected by plant location at alternative sites, and the structural suitability of alternative sites.

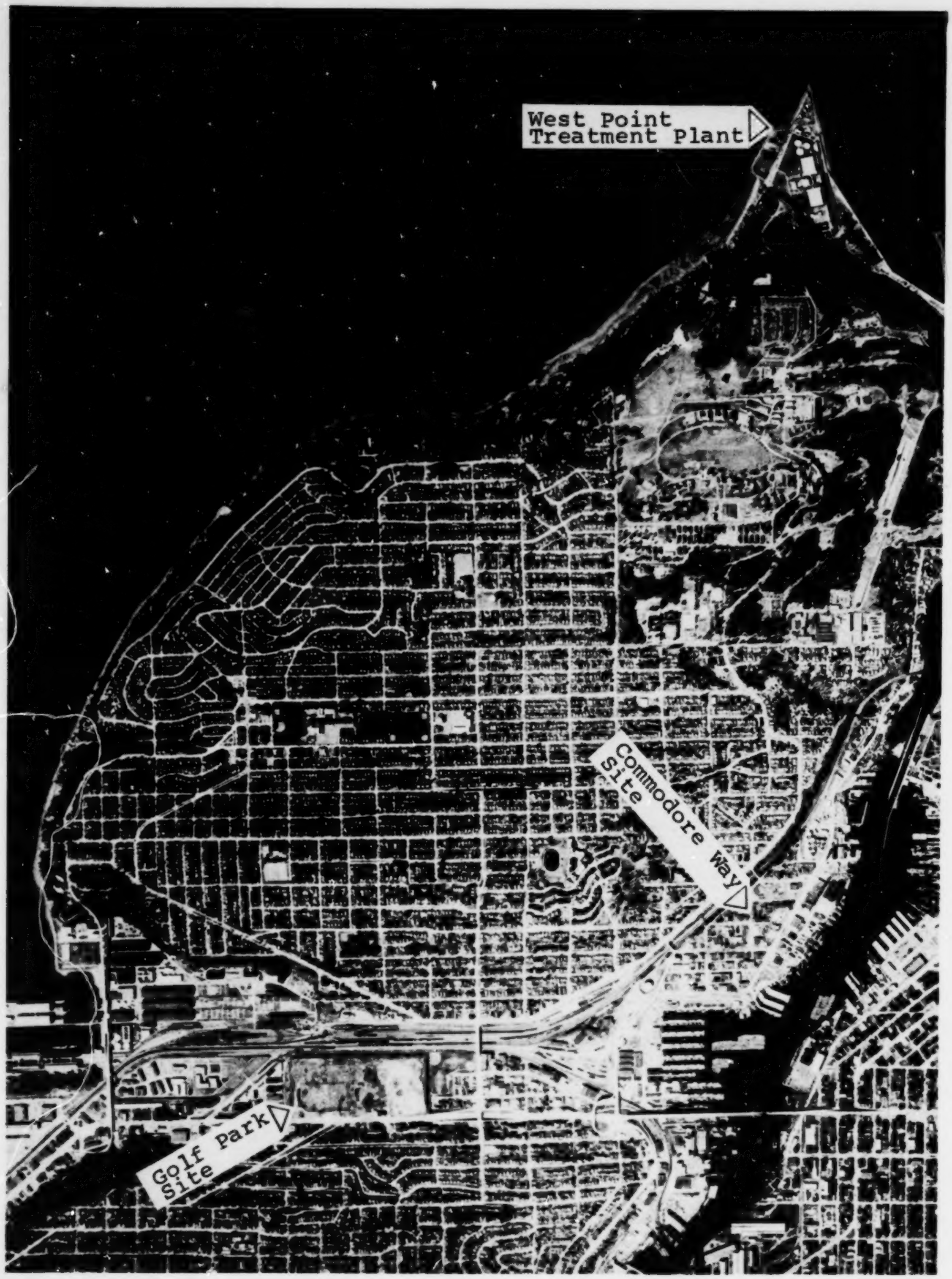
West Point
Treatment Plant
Commodore Way
Site
Golf Park
Site

Figure 1-3
Aerial View of West Point and Interbay Sites

Background

Recommendations for lessening the impact of the present plant on Discovery Park included removing the sludge lagoon, landscaping and screening the facility, and processing Renton sludge elsewhere.

City residents near West Point questioned the need to treat sewage from newly developed areas at West Point and expressed a preference for decentralization.Limited information has been collected on the preference of residents of North Lake Washington or other inland areas that could be used in a decentralization alternative. Other items relating to regional concerns that were expressed at the West Point meeting included federal requirements for secondary treatment, the relationship between 201 and 208 planning, mechanisms for wastewater flow reduction, plant siting and sludge treatment alternatives and shoreline access.

The Magnolia Community Club also drafted a comprehensive letter to Metro setting forth numerous goals and criteria for use in the evaluation of wastewater treatment plant expansion proposals. Among the issues covered are impacts on geology, water resources, air quality, energy and natural resources, ecosystems, unique features, demography, economy, land use, aesthetics, and community safety and infrastructure.

A public workshop was held in June 1977 which informed citizens of the eight proposed alternatives and solicited their comments on the site-specific impacts of each. Most of the concerns centered around economic impacts at a possible Commodore Way site. Summary of comments is shown in Chapter IV.

A public hearing on the Draft EIS alternatives as they affect West Point and regional concerns is scheduled for the Fall of 1977.

CHAPTER II

ENVIRONMENTAL SETTING

The environmental characteristics of the West Point site and proposed alternatives at Commodore Way and the Golf Park are discussed in the following sections. The West Point service area is described in Chapter II of the regional analysis which is Volume I of this series and will not be repeated in detail here.

Alternative sites to West Point in the Interbay Area have been examined to allow the eventual phaseout of West Point. The Golf Park site included in the Draft Facility Plan and the optional Commodore Way site are described herein.

For analytical purposes, the environmental setting is subdivided into the physical, biological and human environments. It is clearly understood that the three overlap, but this artificial division ensures a thorough analysis of relevant impacts.

PHYSICAL ENVIRONMENT

A description is offered in terms of the characteristics of the topography, geology, soils and seismicity of the three sites, the waters actually or potentially affected by treatment facilities on those sites, and atmospheric characteristics including climate and air quality.

Topography

The West Point treatment plant, the largest in the Metro system, is situated on a flat triangle of land pointing due west into Puget Sound. The site was prepared by the construction of a seawall and the deposition of a half million yards of hydraulic fill over the soft surface soils. Ten years later a sludge lagoon was constructed on the shoreline south of the plant for research purposes. Topography is shown in Figure 2-1.

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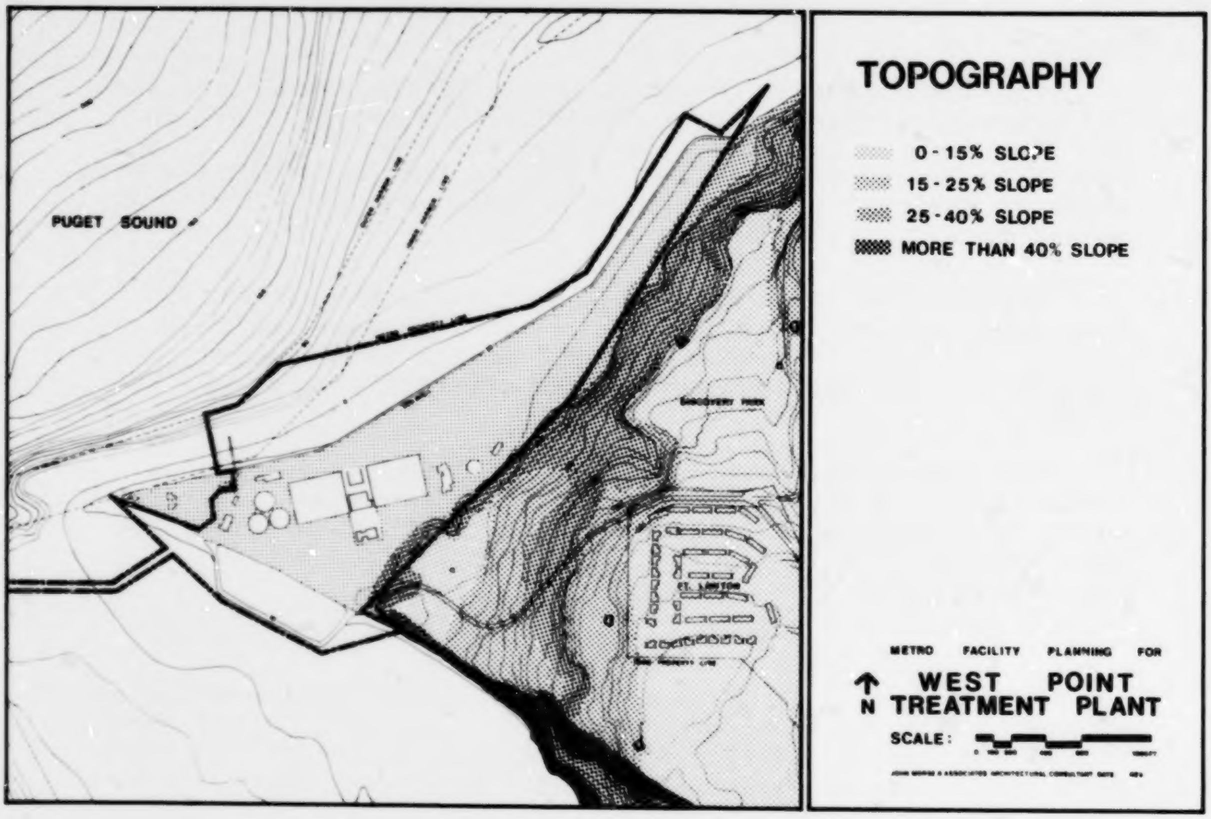

TOPOGRAPHY
0 - 15% SLOPE
15 - 25% SLOPE
25 - 40% SLOPE
MORE THAN 40% SLOPE
PUGET SOUND
METRO FACILITY PLANNING FOR
N
WEST POINT TREATMENT PLANT
SCALE:

Figure 2-1

West Point Topography

Metro owns approximately 80 acres at West Point, of which 23 lie outside the seawall and are submerged at least part of the time. Forty-four of the remaining 55 acres are considered usable, excluding five acres of easements and the sludge lagoon. Fill and subsequent use of the lagoon area for structures is questionable as this action would be in conflict with the Shorelines Management Act. The structures necessary under the eight alternatives were planned in such a way that the sludge lagoon would not need to be used.

A U. S. Coast Guard lighthouse station is located on the extreme tip of the point, adjacent to the West Point facility. The low, flat windy point is separated from the adjacent uplands by steep 200 ft bluffs. Access to the treatment facility and the lighthouse is by a road down the west exposure of the bluff. Some concern has been expressed that the configuration of the sludge lagoon alters longshore sediment transport through erosional and depositional conditions which may develop north and south of the structure, respectively.

Dominant topographic features of the Magnolia/Interbay area are the upland areas of Magnolia and Queen Anne Hill and the Interbay Valley which runs north-south between these uplands. The southern part of the Interbay Valley is bounded by Elliott Bay; to the north is a saucer-like depression drained by the Ship Canal. Magnolia itself is actually composed of two hills with a north-south depression in the center. Steep bluffs are found on its southern and western margins. See Figure 2-2 for topographic cross-sections of the West Point/Magnolia/Interbay area.

The Commodore Way site is generally flat with a gentle slope toward the Ship Canal. As shown in Figure 2-3, the Burlington-Northern railroad tracks lie in an artificial depression running in a northwest-southeast direction at the southwestern margin of the site. As indicated, the grade increases markedly in a southwesterly direction toward Magnolia just beyond the site boundary.

The Interbay garbage dump or Golf Park site was originally situated in an intertidal zone and was submerged during high tides. City of Seattle street maps indicated that the ground surface in 1899 was generally at elevation 104 (100 = MSL). Easterly and northeasterly the site was located at the toe of the west slope of Queen Anne Hill and was relatively higher in elevation. Hetergeneous fill material was thereafter dumped at the site to about elevation 143 in the south and elevation 165 in the north, varying from 40 feet to 50 feet above the original ground elevation and some 30 feet above the present existing grade. Below the original ground surface, alluvial sands, silts and some peat will be found at the site,

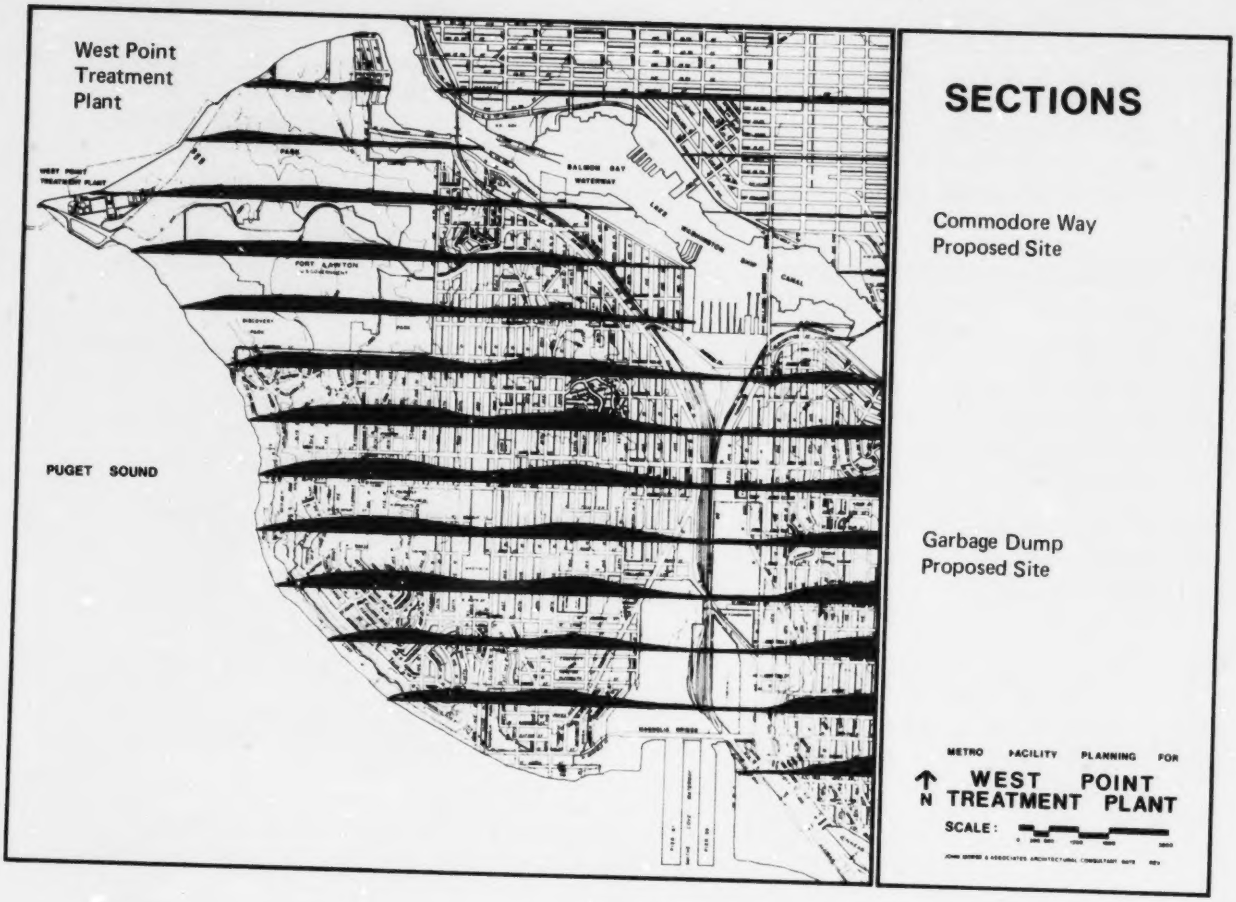

West Point Treatment Plant
WEST POINT TREATMENT PLANT
PUGET SOUND
FORT LAWTON
DISCOVERY PARK
SALMON BAY WATERWAY
LAKE WASHINGTON SHIP CANAL
MAGNOLIA BRIDGE
SECTIONS
Commodore Way Proposed Site
Garbage Dump Proposed Site
METRO FACILITY PLANNING FOR
N
WEST POINT TREATMENT PLANT
SCALE:
0
1200
2800

Figure 2-2

Topographic Cross Section — —
West Point — Interbay Area
(Including Proposed Treatment Sites)

(Metro, 1977)

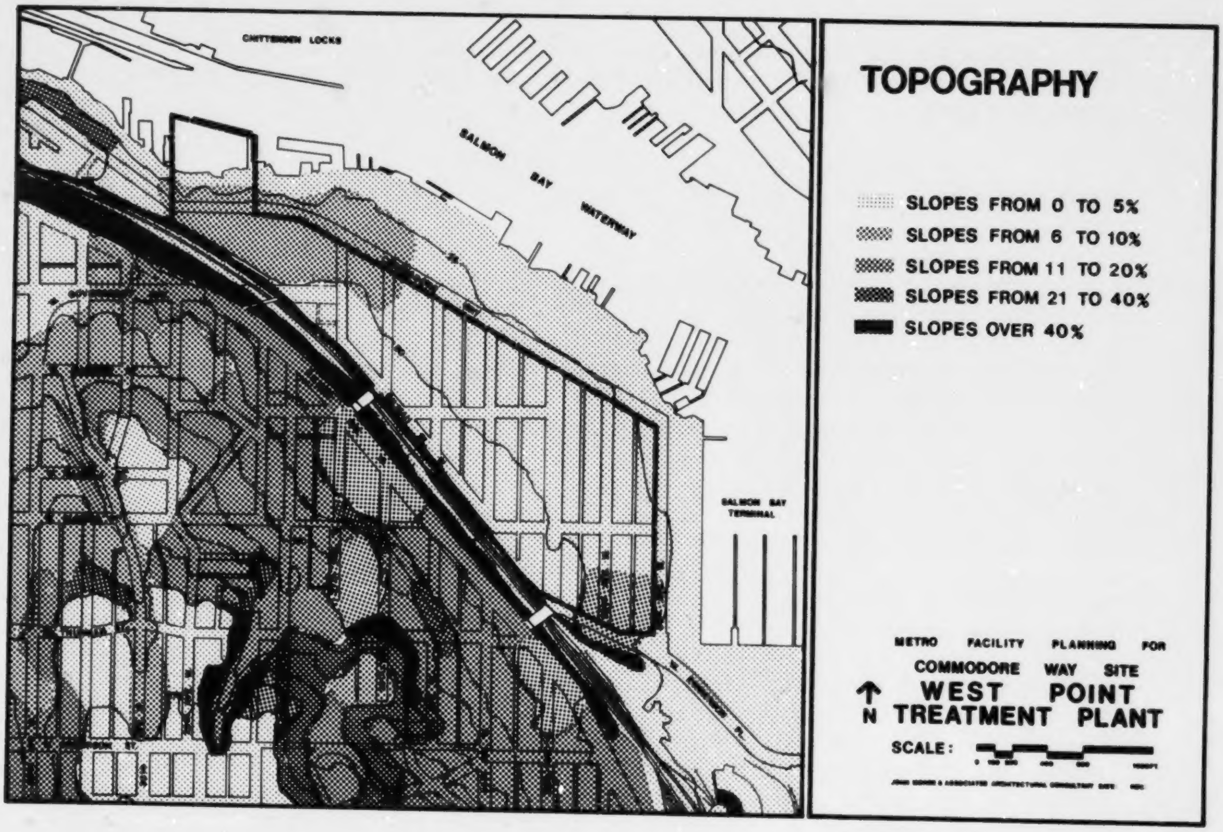

CHITTENDEN LOCKS
SALMON BAY WATERWAY
SALMON BAY TERMINAL
TOPOGRAPHY
SLOPES FROM 0 TO 5%
SLOPES FROM 6 TO 10%
SLOPES FROM 11 TO 20%
SLOPES FROM 21 TO 40%
SLOPES OVER 40%
METRO FACILITY PLANNING FOR
COMMODORE WAY SITE
WEST POINT
TREATMENT PLANT
N
SCALE:

Figure 2-3
Topography — — Commodore Way Site

and glacial deposits or overconsolidated material will probably be encountered at the toe of Queen Anne Hill. The surface fill material was from all sources, ranging from rubble to garbage and was dumped in place at random. Figure 2-4 shows this site.

Geology and Soils

Discussion of geology and soil conditions at specific sites (existing and potential) within the West Point service area follows.

West Point

The West Point site consists of alluvial material, chiefly unconsolidated silt, sand and gravel fill with some clay present. Much of this material was generated through shoreline processes (wind, waves, and tidal action) reworking glacial deposits eroded from the bluffs above. The steep bluffs are considered unstable and there is evidence of sliding and slumping at various locations. See Figure 2-5 for geologic site constraints.

Large slide areas are particularly noticeable along the cliffs facing Puget Sound. A pronounced example of sliding is located along the south and west sides of Magnolia Bluff extending from Smith Cove on the south to just south of West Point. Within recent years, numerous slides have occurred in the Perkins Lane West area and have caused damage to city water pipes and utilities. Geological investigations indicate that this area lies along a contact zone between two glacial deposits. North of West Point toward Shilshole Bay, four large slide areas are located. One, extending approximately 1,300 feet along the bluff and from 300 to 500 feet from the toe, is centered above the portal of the north trunk sewer tunnel.

The slide-prone nature of these bluffs limits eastward expansion of the West Point facility. Cutting the bluffs would remove support at their base, causing them to collapse. Expansion into the water is by ordinances (Shorelines Management Act) which control shoreline fill, except for emergencies. Prior to placement of fill, part of this area accumulated as a result of slide debris and gully erosional deposits, and part was reworked by wave processes in the intertidal zone. Sloughed materials from undercut bluffs were removed, redistri-

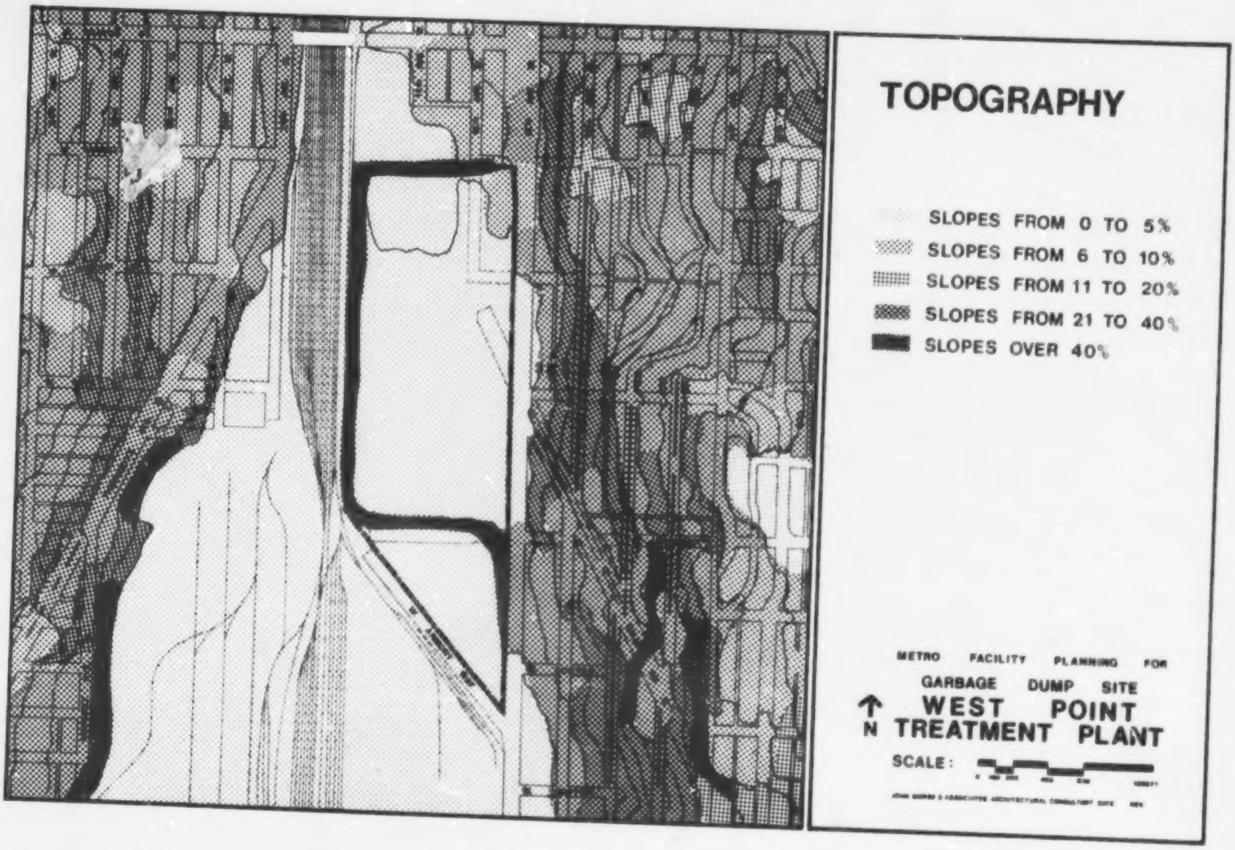

TOPOGRAPHY
SLOPES FROM 0 TO 5%
SLOPES FROM 6 TO 10%
SLOPES FROM 11 TO 20%
SLOPES FROM 21 TO 40%
SLOPES OVER 40%
METRO FACILITY PLANNING FOR
GARBAGE DUMP SITE
WEST POINT
TREATMENT PLANT
N
SCALE:

Figure 2-4

Topography — — Golf Park Site

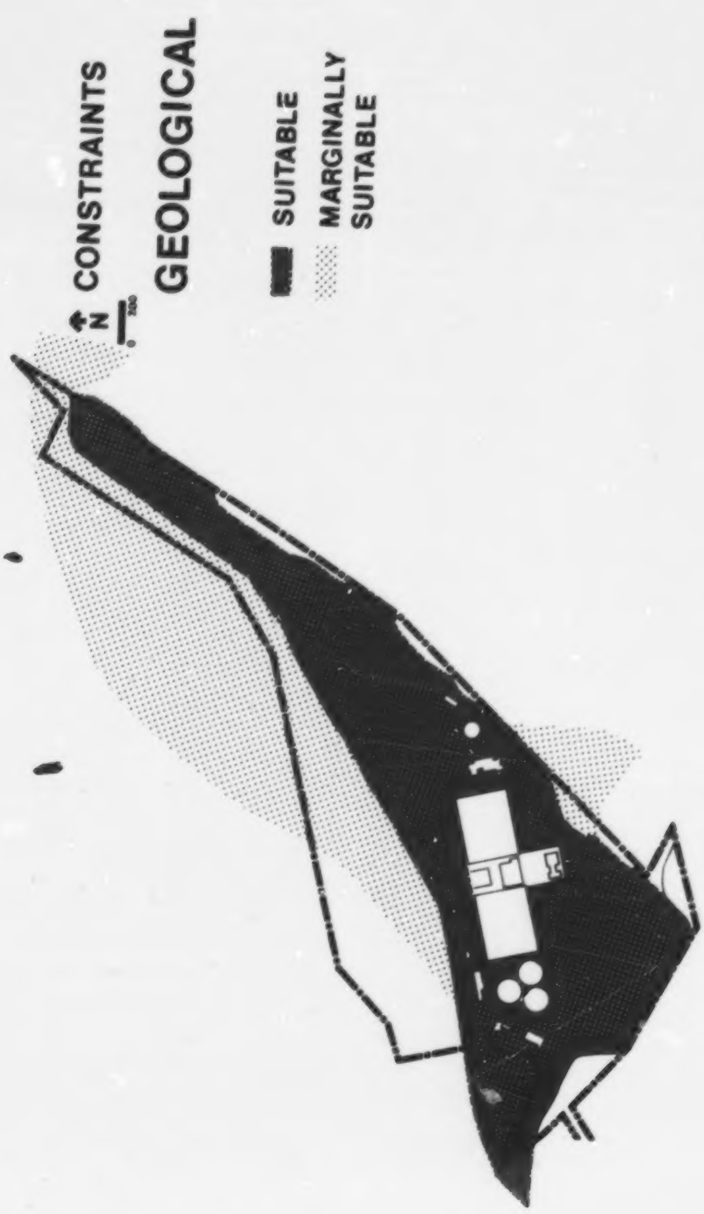

GEOLOGICAL
CONSTRAINTS
N
0
100
SUITABLE
MARGINALLY SUITABLE

Figure 2-5

Geologic Constraints — — West Point Site buted and redeposited by wave action, with the granular materials being deposited nearby and the fine materials carried into the deeper portions of the Sound. The intertidal area was generally covered up to two feet in thickness with dark gray to blackish sand and gravel containing some shell fragments. Underneath this surface zone were beach sands of varying depth. Firm silts and clays were found in previous borings to underlie the sands. These fine materials were consolidated by the glacier of the latest Vashon glaciation. Landslide zones are shown in the regional document as Figure 2-4.

During the placement of the on-site hydraulic fill, the soft surface soils were not removed. Trees were cut off but the stumps were left in place. Surface logs, if not partially buried, were removed.

Since the West Point site has mixed soil conditions, it is suggested that piling be considered as structural support. An applicable foundation can be chosen when structure locations and specific soil information at these locations become available (Metropolitan Engineers, 1977).

As it exists today, the south beach of West Point is a broad shelf which varies from pure sand and sandy gravel in the mid to upper intertidal zone to mud in the lower intertidal. North Beach is narrower, steeper and consists of sandy gravel, cobbles and a few large erratics. Both beaches have bulkheads to protect onshore structures during high tide conditions.

Commodore Way

The entire site is believed to have overconsolidated and impervious clayey soils. These are classified as Pleistocene Upper clay, predominantly laminated to massive clay and silt, locally including sand, gravel and peat. These clayey soils bear structures well if not disturbed or softened. Because of their impervious characteristics, site drainage may be necessary so that water not accumulate in deep foundation excavations.

Golf Park

At the Golf Park site, between 40 and 50 feet of heterogeneous fill has been dumped since 1899. Beneath the original ground surface, which was once an intertidal zone, are alluvial sands, silts and some peat. To use this site for treatment plant expansion, most surface fill would have to be removed. In fill removal, consideration would have to be given to control of odor and methane gas resulting from years of unrestricted dumping.

Piling would be required for support of all structures. Corrosion of steel pile is a problem due to acidic conditions and because most of the natural deposits are from a seawater environment. Consequently, prestressed reinforced concrete pile would probably be necessary (Metropolitan Engineers, 1977).

Seismology

A high seismic risk potential occurs in fill, such as at West Point and the Golf Park sites, as it is unstable and transmits long-wave vibrations. The Magnolia area has experienced five intensity VII earthquakes (Modified Mercalli Scale) in the last 133 years. Thus, one intensity VII earthquake could be expected during the planning period. This makes fill in the West Point-Magnolia a high risk foundation for structures. Rasmussen et al. (1974) have stated that "one should not build at this location unless the structure is specifically designed to take into account substantial ground shaking and possible soil failure".

The Commodore Way site is characterized by overconsolidated impervious soils which tend to be poorly drained but bear structures well. Buildings on these hard soils could experience moderate amplification of long period vibrations and greatest amplification of short period ground vibrations, as experienced in West Seattle during the last large earthquake. Low rise buildings (less than seven stories), such as treatment plants, which have a natural short vibration period could be more susceptible to damage on such foundations.

Climate

The regional climate is described in the regional analysis which is Volume I of this series.

Temperatures in the West Point area range from a mean of 40^oF in winter to a mean of 80^oF in the summer. The average annual rainfall in the West Point service area of 40.12 inches per year is typical of the Puget Sound region and is about equal to the average of the Metro area. The total rainfall for any given month may vary considerably from year to year.

Air Quality

Air quality within the West Point service area is quite variable. The industrialized Duwamish airshed is subject to the most intensive pollutant loadings in the metropolitan Seattle area. By contrast, the eastern portions of the service area near Lake Sammamish contain relatively few major point sources, and air quality problems tend to be the result of regional air stagnation. Within the city proper, lowland areas such as Interbay and Lake Union and the Duwamish valley tend to act as sinks for air pollutants, particularly during periods of limited air circulation such as occur in the autumn. For a more complete discussion of regional air quality and specific pollutant loadings in the Metro study area, refer to Chapter II of the Regional Analysis (Volume I).

From an air quality standpoint, the site of the West Point treatment plant itself is well-ventilated. Air that approaches West Point has been traveling considerable distances over open water with little topographical restriction.

Odor complaints have never been received with regard to the West Point facility. Only under calm conditions, which occur about 10 percent of the time, could there be an odor problem outside the plant and even then it would probably only affect the lighthouse station and any people on the public beach directly adjacent to the area south of the plant. A subsidence inversion producing atmospheric stagnation can concentrate plant emissions, but this is an infrequent occurrence. Mitigation measures for odor reduction at the present facility include prechlorination, waste gas flaring and good plant practices.

At the Golf Park and Commodore Way, there would be more concentration of odor since these sites are not as well ventilated.

Since the air quality sampling network for Seattle is only concentrated in problem areas, ambient air data at or near West Point is virtually nonexistent. Dispersion is excellent and any air pollutants emitted from the plant are considered to be insignificant except under adverse meteorological conditions. A summary of existing concentrations for the Interbay Valley is, however, given in Table 2-2.

A tabulation of present and projected air pollutant emissions from West Point facility is found in Table 2-1.

Table 2-1

West Point Treatment Plant Air Pollutant Emissions Estimated by PSAPCA (tons/year)*

	1976	2005
Particulate matter	--	12
Nitrogen oxides	85	180
Carbon monoxide	11	20
Hydrogen sulfide	--	4
Hydrocarbons	31	65

Source: Metropolitan Engineers, West Point Facility Plan 1977.

* Emissions of the largest pollution source in each of these categories are 100 to 1000 times as big.

Table 2-2

Summary of Pollutant Concentrations (Micrograms per Cubic Meter)

	From Outside Service Area	Generated Within Service Area
Sulfur Dioxide		
Interbay	156	260
PSAPCA Standard: 230 for 24-hour average		
Nitrogen Dioxide		
Interbay	160	186
PSAPCA Standard: 100 for annual average		
Particulates		
Interbay	90	136
PSAPCA Standard: 150 for 24-hour average		
Hydrocarbons		
Interbay	UKN	286
PSAPCA Standard: 160 for 3-hour average		

Environmental Setting

Water Resources

Hydrographic Features

Two water bodies, Puget Sound and the Ship Canal, are in proximity to the West Point Wastewater Facility.

The Ship Canal, used by migrating salmon, has been classified as mesotrophic-eutrophic (highly fertile). The dissolved oxygen concentration is low, especially in the stratified lower depths of Lake Union during the summer. Coliform bacteria levels exceed state standards, especially at times of combined sewer overflows. Heavy metal concentrations in the Ship Canal sediments have increased in the past 80 years. More detail of the Ship Canal is developed in the Regional Document.

Puget Sound is a fjord-like estuary carved by glaciers from an older river valley system. As part of Washington's inland seawater system, it lies south of the northern end of Admiralty inlet and east of Deception Pass. Two million people, one half of Washington's population, live along its perimeter. Wastewater treatment outfalls discharge a total to 150 mgd into this water. Puget Sound supports a large salmon fishing fleet, international commerce, and much recreational boating. Because of its large size, Puget Sound has a moderating effect on Seattle's climate.

Water Quality and Currents

Puget Sound develops tide-induced currents illustrated in a Puget Sound model basin (Lincoln and McGary, 1975). Details are discussed in the Regional Analysis, Volume I, Chapter II of the EIS series. Currents can affect effluent dispersion, since the discharge from West Point is in the lee of the land and the receiving water is either slow-moving or involved in an eddy system which has been found to occasionally convey the effluent to shore.

Density differences also affect effluent dispersal, as the freshwater discharged from rivers stays above saltwater. Wastewater, with a density intermediate between salt and freshwater, is dispersed to the interface. Generally, the fresh water moves predominately northward, and on incoming tides the salt water flows southward. Thus, the wastewater effluent at the interface between these two flows has less net movement, and may stay in place for many tidal cycles.

Environmental Setting

Studies of the wastewater effluent flows have been made using Rhodamine B dye. At the discharge, this dye was diluted by seawater to 1:140, and remained in discrete filaments and patches. Upon arrival at some beaches north and south of West Point where it was sampled on one occasion, it was diluted twice more, to 1:250 (Bendiner & Ewart). Further studies to determine the frequency and distribution of effluent are planned by Metro.

More details on dilution and dispersal at West Point are covered in Volume I, Regional Analysis.

Groundwater

Groundwater at West Point is not used for municipal supply.

BIOLOGICAL ENVIRONMENT

The habitats in and around the three treatment plant sites include urban terrestrial, non-urban terrestrial, forest, freshwater wetlands, marine intertidal, Lake Union/ Ship Canal and Puget Sound.

Terrestrial Habitats

Terrestrial habitats have been highly modified through the human activities of clearing, development and replanting into urbanized commercial, industrial and residential areas. The shores of Puget Sound and the Ship Canal are examples. As terrestrial wildlife correlate with vegetation diversity, the richest fauna are found in the areas of natural vegetation which remain scattered through the area. A more detailed description of terrestrial habitats is included in Chapter II of the Regional Analysis.

The West Point treatment plant is located between the lighthouse and Discovery Park. The grounds around the plant are lawn covered, and the beaches to the north and south are rocky and sandy. A meadow area lies adjacent to the plant to the north. An abandoned sludge lagoon of about five acres is located south of the plant across the access road. Bulkheads provide protection from normal high tide conditions and permit use of areas which would normally be under water at high tide. The lawn provides only a limited terrestrial habitat; however, the meadow area has grown over with tall grasses and low shrubs providing habitat for ground nesting birds and small mammals. It serves as a feeding area for forest nesting birds. The meadow area also supports a floral community unique to West Point and the north beach of Discovery Park. Plants rare or unknown elsewhere in the park include Grindelia integrefolia, Ambrosia chamissonis and Anthemis cotula. These plants have been used in the interpretive programs at the Park. The beach is an important area for marine invertebrates and shorebirds. A variety of diving ducks, grebes, loons and scoters feed in the neashore water.

The former sludge storage area supports a mix of grasses, small shrubs and aquatic vegetation, which provides a limited protective habitat for waterfowl. Restoration of the lagoon to more natural conditions would increase the feeding area for diving ducks and shorebirds, and invertebrates and marine flora would in all probability soon repopulate the intertidal zones of the restored beach. Another possibility would be to breach the seawall, allowing seawater to circulate into the lagoon. This would result in a small yet highly productive artificial salt marsh. Any alterations to the lagoon would have to be weighed carefully in terms of environmental effects and other projected uses of the West Point area.

The vegetation of Discovery Park reflects its use as a military fort. Since the army has used the greater part of the site at various times and in doing so did considerable clearing, many of the tree groups are alders and willows, which are among the first to reforest cleared land, but are not long-lived. Very few evergreens exist on or near the bluffs, and there appears little evidence of madronas, which are characteristics of Magnolia Bluff. The Discovery Park Master Plan calls for a planting program to reinforce and restore the natural character of the setting.

Aquatic Habitats

Aquatic habitats are sensitive to waterborne pollutants from treatment plant effluents, combined sewer overflows, direct runoff, aerial fallout and the like and must be protected to meet the 1983 "fishable-swimmable goal" of Public Law 92-500. Aquatic habitats of the Metro area are described in some detail in the regional analysis; this document briefly includes only those adjacent to or affected by existing and proposed facilities in the West Point service area.

Lake Union-Ship Canal

The biology of Lake Union and the Ship Canal has been changed significantly by industrialization along its shores, by saltwater intrusion and by periodic dredging for navigational purposes. Some deep sediments are almost entirely devoid of life and the physical-chemical water quality data suggest the Lake Union waters are generally not suitable to maintain a resident salmonid population due to oil spills, boat sanitary wastes, combined sewer overflows and saltwater intrusion. Resident fish are similar to those found in Lake Washington and include yellow perch, peamouth, northern squawfish, largemouth bass, black crappie and brown bullheads. These species generally have less stringent environmental requirements than do salmonids.

The most important biological aspect of the Ship Canal is its use as a migration route for salmonids on their way to spawning and rearing grounds in the Lake Washington drainage. Over the 1966-1971 period, escapement of sockeye, coho and chinook salmon averaged nearly 200,000 fish, a significant portion of the salmon migration in eastern Puget Sound. Estimated contribution of the Lake Washington drainage to sport and commercial fisheries ranges from 110,000 to 500,000 salmon annually. The Department of Fisheries estimates that by 1980 some 1,000,000 sockeye, 250,000 coho and 16,000 chinook will pass through the Chittenden Locks. A modern fish ladder has recently been installed at the Locks to facilitate migratory salmon as well as steelhead and searun cutthroat. The University of Washington operates a research hatchery for salmon and steelhead at Portage Bay. In addition to its importance as a route for migrating adult fish, the Ship Canal-Lake Union system is a critical area for juveniles migrating from the Lake Washington system to Puget Sound. Adequate water quality is essential if these juveniles are to reach saltwater below the locks.

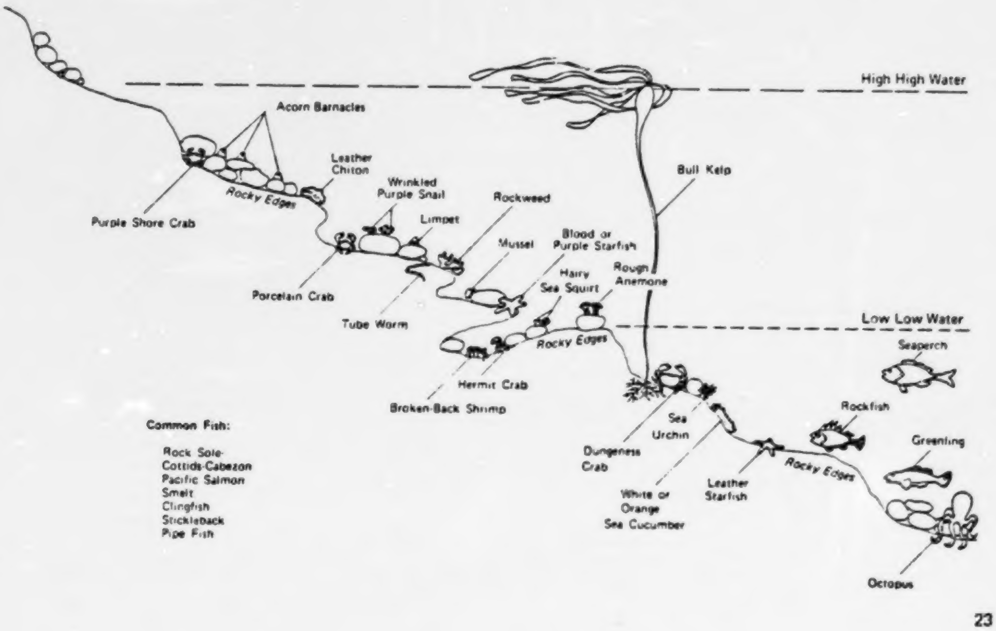
Puget Sound

The West Point outfall discharges an average of 75 to 90 mgd at a depth of 240 feet off West Point. The fate of the effluent has been traced with dye as discussed in a previous section of this document, and is subject to the effects of tidal currents which break the plume into patches, some of which are occasionally brought onto the beaches north and south of West Point at a dilution twice that at the outfall diffuser.

The waters off West Point support communities of marine plants, invertebrates and fishes. The three most easily identified intertidal and subtidal communities are shown in Figures 2-6, 2-7, and 2-8. Sandy gravel tidelands are found at Golden Gardens,and on the north side of West Point and at Magnolia are muddy silt and sand communities. Rock and cobble habitats are less common but occur near Meadow Point.

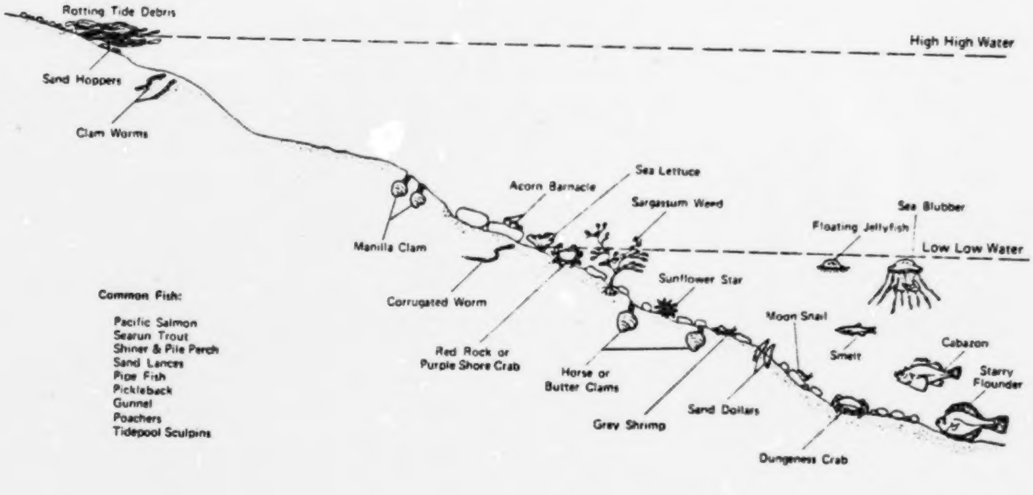
The intertidal. Surveys of intertidal macrofauna and macroflora have been made every third year in spring since 1971. A significant difference in faunal diversity between the north and south beaches is attributed to sediment and substrate type, degree of wave action and physical factors. The north beach, which had a greater diversity of organisms, also had a greater variety of habitats. The sandy portion of north beach, an unstable, uniform habitat, had the fewest species of animals. The south beach, which is more uniform than the north, has a compact sand and mud substrate inhabited primarily by polychaete worms. In 1971 a hydrogen sulfide odor was detected, associated with a groundwater seepage on the

Rock and Cobble Tidelands


High High Water
Acorn Barnacles
Leather Chiton
Wrinkled Purple Snail
Rockweed
Bull Kelp
Rocky Edges
Purple Shore Crab
Limpet
Mussel
Blood or Purple Starfish
Hairy Sea Squirt
Rough Anemone
Porcelain Crab
Tube Worm
Low Low Water
Rocky Edges
Seaperch
Hermit Crab
Broken-Back Shrimp
Common Fish:
Rock Sole-
Cottids-Cabezon
Pacific Salmon
Smelt
Clingfish
Stickleback
Pipe Fish
Sea Urchin
Dungeness Crab
Rockfish
Greenling
Rocky Edges
White or Orange Sea Cucumber
Leather Starfish
Octopus
23

Figures 2-6 and 2-7
West Point aquatic communities
(McGreevy 1973)

Sandy Gravel Tideland


Rotting Tide Debris
High High Water
Sand Hoppers
Clam Worms
Sea Lettuce
Acorn Barnacle
Sargassum Weed
Sea Blubber
Floating Jellyfish
Low Low Water
Manilla Clam
Corrugated Worm
Sunflower Star
Common Fish:
Pacific Salmon
Searun Trout
Shiner & Pile Perch
Sand Lances
Pipe Fish
Pickleback
Gunnel
Poachers
Tidepool Sculpins
Moon Snail
Smelt
Cabazon
Starry Flounder
Red Rock or Purple Shore Crab
Horse or Butter Clams
Grey Shrimp
Sand Dollars
Dungeness Crab

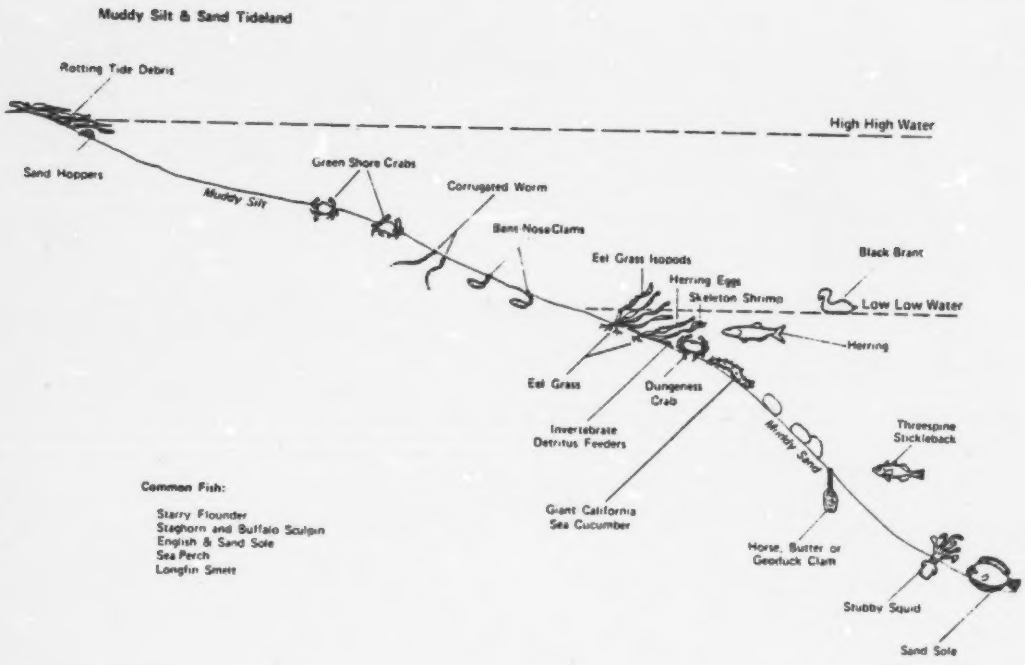

Muddy Silt & Sand Tideland
Rotting Tide Debris
High High Water
Sand Hoppers
Muddy Silt
Green Shore Crabs
Corrugated Worm
Bent Nose Clams
Eel Grass Isopods
Herring Eggs
Skeleton Shrimp
Black Brant
Low Low Water
Herring
Eel Grass
Dungeness Crab
Invertebrate Detritus Feeders
Giant California Sea Cucumber
Muddy Sand
Threespine Stickleback
Horse, Butter or Geoduck Clam
Stubby Squid
Sand Sole
Common Fish:
Starry Flounder
Staghorn and Buffalo Sculpin
English & Sand Sole
Sea Perch
Longfin Smelt

Figure 2-8
West Point aquatic communities
(McGreevy 1973)

north beach. Septic tank seepage from Lawtonwood enters a small creek which also empties onto the north beach. It has also been suggested that the increase in species at the north beach represents a natural re-population from the time of raw sewage discharge in that area before 1965 (J. McDonnell, 1977).

The 1977 analysis of intertidal animals sampled in 1971, 1973 and 1975 indicated that the differences between the north and south beach assemblages were due to substrate characteristics, and that the study could show no measurable effects of wastewater impact on the intertidal fauna. Impacts may have occurred on more sensitive intertidal organisms, such as algae and larval invertebrates or phytoplankton. Stress effects from continued exposure to low levels of wastewater (such as changes in behavior or reduced levels of reproduction) have not been examined.

There do appear to be differences in marine flora, however, reflected as minor modifications of community structure at the beaches sampled. The various species of algae are highly, yet differentially, sensitive to environmental changes such as from sewage. Changes in growth and timing and success of reproduction will favor certain species in the intense competition with other species for space and light. Such low-level, long-term and chronic effects are much more difficult to assess, and may affect the intertidal as much in the long run as a short-term major effect. It does appear that flora at West Point are possibly being stressed to a measurable degree, based on studies of more severe situations, possibly by sewage (Thom, _et al_., 1977), and for septic tank seepage. There appear to be almost no CSO's to West Point's south beach which is bordered by Discovery Park. Quantification of the effect is not possible with present techniques.

Generally, an increase in both floral and faunal species occurred over the four year period. "Although an increase in species is generally associated with improved water conditions, the presence of certain animals and algae which may be pollution-related (the green algae _Ulva_ and _Enteromorpha_ and the worm _Owenia_) suggests that some intermediate level of pollution may still remain" (Staude _et al_., 1977). North of West Point, this enrichment may be due to residuals from the old, shallow North Trunk Sewer Outfall, the septic tank seepage from Lawtonwood, and solids and effluent from the existing outfall. More detailed information on intertidal biota at West Point is included in Chapter II of the Regional Analysis.

Recreational shellfishing at West Point beaches is less intensive than at Alki, probably as a result of more limited access at West Point and Discovery Park policy which prohibits clam digging. Shellfish at West Point include hardshell clams, geoducks and crabs. Apparently, mussels continue to be occasionally taken on the north side of West Point where septic tank seepage and residuals from the North Trunk Outfall may impact water quality. The Seattle-King County Health Department has recommended that the mussels not be taken from this site as cooking them long enough for safety makes them inedible. Also, fecal coliform monitoring data for 1976 (Metro Staff, 1976) show that none of the waters at West Point meet state standards for commercial shellfish production. Heavy metals are also somewhat higher in West Point intertidal organisms than at a background station (Point No Point). United States standards in fish and shellfish for mercury (500 ng Hg/g wet weight), and the Canadian Standard for lead (2 mg Pb/g wet weight) are met by West Point fish and clams. Levels of pesticides and toxicants in these organisms are not well known.

Current disinfection practices at West Point not uncommonly result in high chlorine residuals in the effluent. Total residual chlorine and the byproducts of disinfection, chloramines, have been shown to be highly toxic to a range of marine organisms at very low concentrations (Brungs, 1976). Safe levels for West Point effluent residuals are not exceeded on the average, but peaks occur not uncommonly that could result in high residuals in receiving waters (Stober et al., 1977). At the same time, chlorine toxicity has not been demonstrated in the field, so the actual effects of West Point effluent are undetermined.

The effects of effluent and such residuals on biota at the outfall have not been directly determined, but the biota observed could represent more tolerant species. Chronic effects on sensitive organisms may also occur, as salmon feed inshore at certain life stages, and deep water fishes move inshore at night to feed. Miller (1976) has stated that "while no direct cause and effect relationship can be demonstrated at West Point, the evidence thus far suggests that the deep water fish communities there may have been altered by the discharge of wastewater from the Metro facility." Differences include higher catch per haul, high abundance of ratfish, reduction in diversity and evenness and the replacement of slender sole by rex sole. Unlike slender sole, rex sole feed on benthic infauna which may have increased due to alterations in environment from the outfall, as suggested by studies of California outfalls (SCCWRP, 1975; Smith, 1976).

Fish have been examined for the presence of diseases which might be attributed to the wastewater effluent discharge at West Point. In California, high incidences of tumorous sole have been associated with sewage outfalls. The incidence of skin tumors is higher in English sole at West Point than at other sites with the exception of the Duwamish. Increased incidence of disease and parasitism may be a secondary effect of fish congregating around the outfall, increasing contact between them and with effluent. High incidences have also been found elsewhere in Puget Sound, and other waters where sewage pollution is not a problem, but fish may congregate in these other areas as well for different reasons. Fin erosion, thought to be induced by PCB's, was not evident at West Point. This suggests that 1) West Point effluent is low in PCB's or 2) that solids containing PCB's are not accumulating in the sediments. Effluent data apparently support the suggestion that PCB's are low in West Point effluent.

Benthic studies have indicated that certain changes in biota appear to be correlated with the characteristic position of the West Point plume. Studies to determine the effect of the West Point plume on phytoplankton productivity suggest that the only significant longitudinal variation attributed to the West Point outfall is a 15 to 20 percent increase in the 1, 2, 3, 5 and 10-year extreme values at the stations sampled a mile north and south of the outfall. Future nutrient loads to Puget Sound due to population growth could increase this percentage with undetermined effects on the biota of the Sound.

Sport fishing is a popular recreational activity in the marine waters off the West Point service area. Various species of salmon are highly prized. In 1974, nearly 70,000 salmon were caught in the central basin between Richmond Beach and Des Moines. This represented over 210,000 marine angler trips. Many of these fish were caught in the waters of Elliott Bay, the Duwamish Estuary and Shilshole Bay where salmon collect before migrating up the Green/Duwamish River and Lake Washington systems. This fishery is a base for the sizable boating and sport fishing industry which exists in the Metro area.

Although less valued than salmon, a wide variety of bottom fishes are caught by sportfishermen off West Point. These include rockfish, greenlings, flatfish, black cod, lingcod and perch. Many of these are caught from fishing piers along the Seattle waterfront. For more detailed discussion of the marine ecology of the Central Puget Sound basin, refer to the Regional Analysis, Volume I of this series or to the various Interim Study reports for the Municipality of Metropolitan Seattle.

NATURAL RESOURCES AND ENERGY

Natural resources and energy impacts are not analyzed on a site-specific basis. Resources and energy consumption occur on an interrelated basis at the five existing Metro plants and potential new sites. Therefore, these considerations and resource recycling are analyzed in the Regional Environmental Impact Statement.

THE HUMAN ENVIRONMENT

Many facets of the human environment pertinent to the West Point site are discussed and evaluated only in the Regional EIS. This includes such categories as PSCOG Goals and Policies and Transportation Patterns. Such topics can only be analyzed on a regional basis by combining the four main sites plus auxiliary sites (e.g. Ceder Hills and Pack Forest sludge disposal site). This necessity to treat certain topics on a regional basis stems from the interrelatedness of the plants and the trade-offs between alternatives.

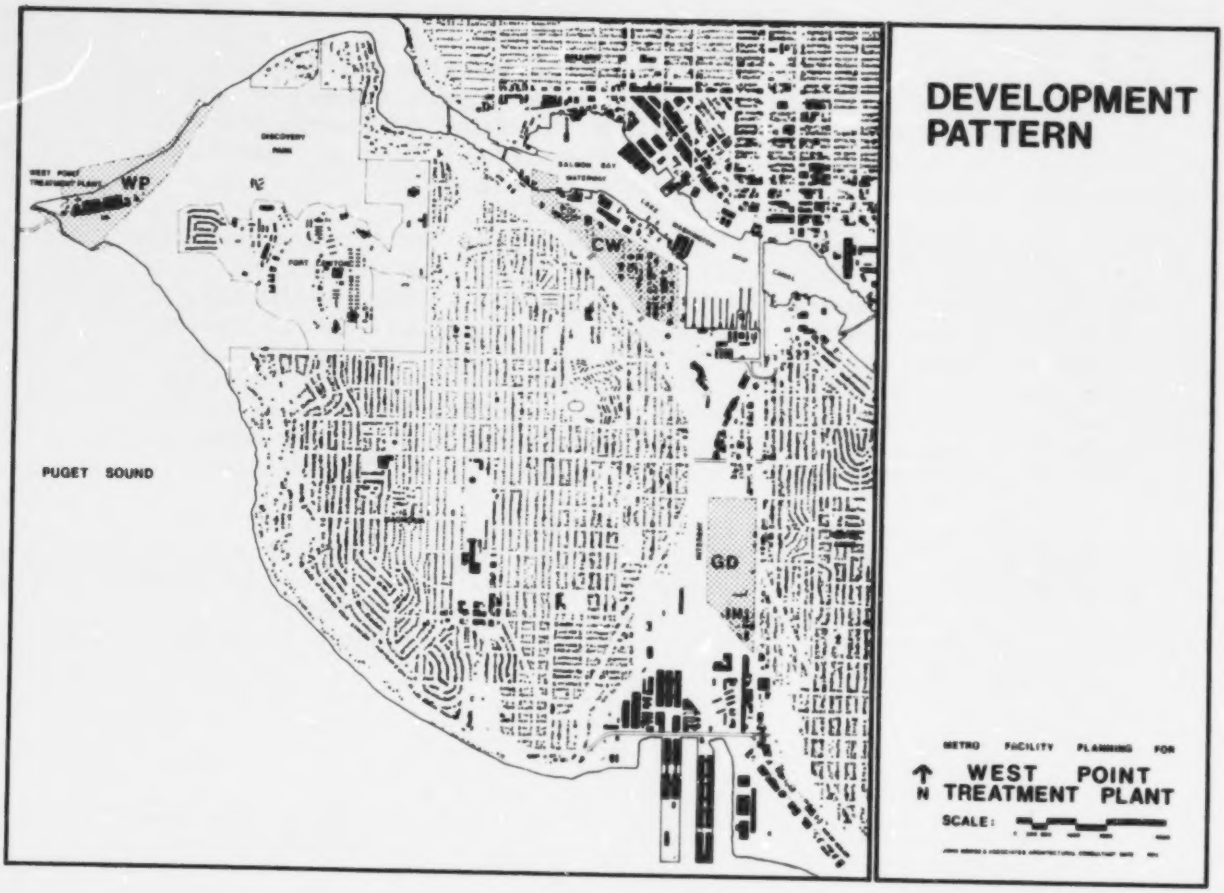
Land Use

This description primarily concerns the Magnolia, Interbay, and Commodore Way areas, which are the most closely associated with the West Point and Interbay sites. To a minor degree, the West Point service area is also considered.

The West Point service area includes the Duwamish Valley and Lake Union/Ship Canal areas and North Seattle, which are principal industrial areas; and the central business district of the City of Seattle.

With the exception of the Fort Lawton/Discovery Park area, most of the Magnolia area is predominately residential. The development pattern for the Magnolia/Interbay area is shown as Figure 2-9. This neighborhood is white collar, upper-middle income, stable and fairly well maintained. No major changes are anticipated in the Magnolia area, other than possible transfers of additional acreage to the City of Seattle by the U.S. Army since the area is fully developed with land uses and population relatively stable.

The Commodore Way area is an important business district related to the seafood industry; large scale negative impacts could result if this site is committed for a sewage treatment


DEVELOPMENT PATTERN
WEST POINT TREATMENT PLANT
WP
DISCOVERY PARK
FORT LAWTON
SALMON BAY WATERWAY
CW
PUGET SOUND
GD
METRO FACILITY PLANNING FOR
WEST POINT TREATMENT PLANT
N
SCALE:

Environmental Setting

Figure 2-9

Development Pattern — — Magnolia/Interbay Area

Environmental Setting

facility. Major industrial and commercial areas are adjacent to Magnolia in the Interbay area and to the north between Gilman Avenue West and the Ship Canal. Major industrial and commercial areas are adjacent to Magnolia in the Interbay area and to the north between Gilman Avenue West and the Ship Canal. Major industrial facilities are in the area including Piers 90 and 91, Burlington Northern's freight yard, the Time Oil Distribution Center, Marine Design and Construction Company (MARCO), and the Port of Seattle's Fisherman's Terminal. Numerous commercial fishing services are also located near Fisherman's Terminal.

The City of Seattle has a Shorelines Management Program and is in charge of shorelines management as described in the Washington Shorelines Management Act. Anyone wishing to build a structure exceeding $1,000 in cost, or to alter existing conditions within 200 feet of the shoreline area must obtain a substantial development permit from the City of Seattle. This permit would be required for use of the Commodore Way site, and expansion of the West Point site - both of which would be within 200 feet of shoreline areas.

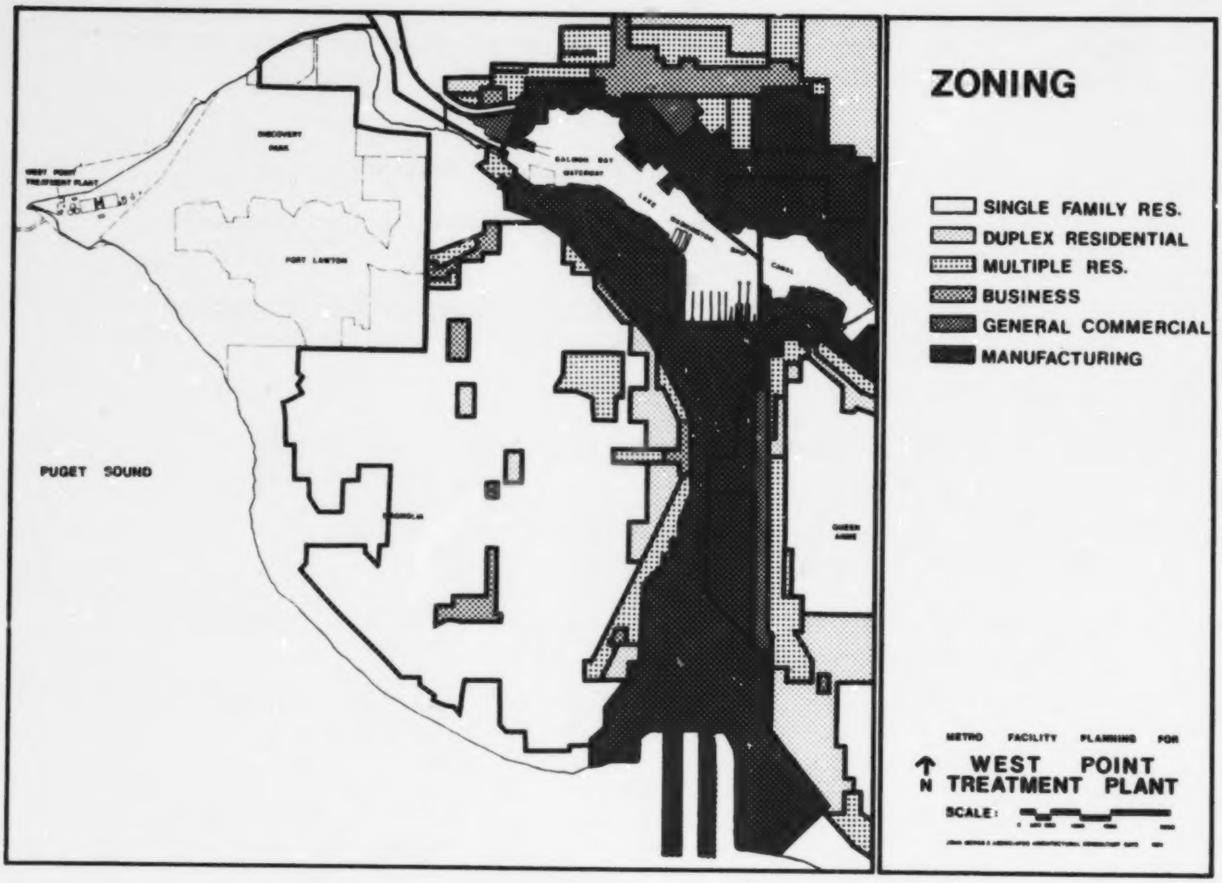
The Seattle zoning for the Magnolia area is shown as Figure 2-10. The West Point site and Discovery Park are zoned single-family residence, medium-security zone (RS7200). The area adjacent to West Point is conservancy natural. Public utilities are allowed as a conditional use in this zone when necessary.

Legal and Institutional

The legal and institutional elements considered include shoreline management regulations, PL 92-500 and U.S. Army Corps of Engineer permit regulations.

Tne City of Seattle Shorelines Management Program has been previously described. These regulations would have direct effect on activities within 200 feet of the existing shoreline. While not necessarily prohibiting expansion activities, the shorelines program could control certain aspects of such expansion.

The U.S. Army Corps of Engineers would have to issue a permit for any obstruction or alternation of a navigable water, such as that possible at West Point. Various state and federal agencies review any application for such a Corps permit and permit actions must comply with NEPA and SEPA requirements. It is likely that shoreline fill or elimination of the sludge lagoon at the West Point site would require a Corps permit. While such a permit may be issued, the review


ZONING
SINGLE FAMILY RES.
DUPLEX RESIDENTIAL
MULTIPLE RES.
BUSINESS
GENERAL COMMERCIAL
MANUFACTURING
WEST POINT TREATMENT PLANT
DISCOVERY PARK
FORT LAWTON
SALMON BAY WATERWAY
LAKE WASHINGTON SHIP CANAL
PUGET SOUND
QUEEN ANNE
METRO FACILITY PLANNING FOR
WEST POINT
N TREATMENT PLANT
SCALE:

Environmental Setting

Figure 2-10

Zoning Pattern — — Magnolia/Interbay Area and approval process may be lengthy, taking up to one year for major projects. It should be determined if permits are needed for alternate sites.

Agency and Neighborhood Goals

Agency goals are described in depth in the Regional EIS. They include the following:

The Puget Sound Council of Governments has proposed the Interim Regional Development Plan, which states:

> "Goal
>
> It is in the public interest to minimize the costs of future growth by encouraging new development within urbanized areas where necessary investments in public services have already been made."

In further expanding on this goal the following policies are included in the proposed document.

> "1. Existing public utilities, facilities and services shall be used to their fullest prior to expansion.
>
> 3. Encourage conservation efforts and the maximum utilization of utilities and services before increasing supply.
>
> 5. The pattern of development which produces the least cost in new public utilities, facilities and services shall be encouraged within feasible limits.
>
> 7. Plans for public services shall be consistent with regional growth policies and local comprehensive plans and shall be based upon: 1) Criteria for population and employment distribution; 2) Policies designed to limit demand, 3) Responsible fiscal management."

Another goal of the PSCOG document related to natural environment and amenities is the following.

Environmental Setting

"1. The natural beauty and liveability of this region shall be a primary consideration in the location, timing and quantity of growth.

   a. Natural amenities identified as important to the regions' character and beauty shall be preserved or sensitively developed as a second choice.

   b. Patterns of development which minimize adverse impacts on these amenities shall be encouraged.

17. Permanent structures designed for human habitation, commerce, employment or public assembly should not be located within high risk zones, including 100 yr floodways, earthquake zones, or active land slide zones.

25. Achievement or maintenance of water quality standards as established by law is recognized and supported."

City of Seattle

As part of its general review authority, the City of Seattle would review the construction of a sewage treatment plant, rehabilitation of sewer lines or extension of sewage facilities through its Building Department. Two permits are required from the Seattle Building Department for the construction of facilities, including one which examines general design and construction and a second concerning filling and grading activities.

King County

In 1964 King County adopted a Comprehensive Plan. Certain provisions of this plan relate to the Metro Facilities Plan and are included as follows:

> "Utilities Development Policies
>
> Trunk utility lines should be installed in advance or at the time of development in accordance with the general plan for the area. Local or service utility lines should be installed as needed.
>
> Where pollution conditions now exist, all possible steps should be taken to correct such conditions."

Goals for Seattle, a report prepared by the Citizens of Seattle and adopted by the Mayor and the City Council:

"D. Goal: Water

The City should undertake all means reasonable and feasible to insure water purity to meet health standards and protect the environment.

1. Undertake efforts to meet Federal Water Pollution Control Act requirements by 1984.

   a. It is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985.

   b. It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

6. Insure clean water to protect wildlife, vegetation and recreation areas."

Neighborhood goals for the Magnolia area have been best described by the "Magnolia Community Club" which drafted a paper entitled, "General Goals and Criteria." This has been adopted by the Club Trustees and is summarized as follows (Metro Engrs., 1977).

> Landscaping should include green belts and shielding. Avoid the "factory appearance." No blockage of views. Do not deny access to shoreline nor public enjoyment of it. Shoreline alterations should be cautiously undertaken and restored to original contours if feasible. Consider undergrounding facilities. Consider effects of leachate and runoff during construction. Examine wastewater reuse potential. Effluent outfalls in saltwater are preferred to those in fresh water. Odor control should preclude external odor protection. Monitor odors tightly. No air pollution increase. Preferred locations would avoid odor and visual impacts on substantial populations. Consider reuse of sludge, centrate and effluent. Avoid waste gas burners. Use methane. Consider facilities impacts on wildlife and aquatic populations. Consider effluent temperature

impacts. Avoid displacement of commercial activity. Plan with Discovery Park in mind. Consider Interbay as a recreational area. Remember site character of Interbay. Sludge lagoon is undesirable. Avoid hazardous chemical use and assure safety. Protect sites from vandalism or sabotage. Consider transportation access. Keep topographic features of sites in mind. Avoid adverse impacts on employment when selecting a site. Minimize adverse construction impacts. Maintain close contact with the community during design and construction. No residential community should have to be affected by two major wastewater facilities. Avoid disruption of neighborhood stability. Relative cost-effectiveness of alternatives should be important consideration. Long range and indirect costs should be considered. Relocation of businesses should consider the possible water-oriented nature of those businesses. Land use goals established by the relevant governmental institution should be considered. Availability of sludge transportation modes should be considered. Site selection and facility design should consider aesthetic impact on the surrounding environment. Ambient noise levels during construction and operation should, if feasible, not increase. Waste gas burners should not interfere with night time views of residents. A facility constructed to improve water quality should not be permitted to pollute the air.

Much consideration must be given to the Commodore Way site, which is currently an important business district related to the seafood industry. Many of the businesses in this area depend on each other for trade; their location is a primary asset. This district has 60 industries. If the Commodore Way site was condemned for a sewage treatment facility, 700-800 jobs would be displaced, (personal communications with Samuel J. Green of Salmon Bay Improvement Association).

The cost of purchasing the land in this site has been estimated at $19.4 million (HRPI).

It has been estimated that the businesses which would be displaced and/or relocated by a Commodore Way sewage treatment plant will contribute 0.8 percent of the City's budget and operations revenues, and 0.127 percent of Seattle's property taxes through the year 2005. This would have a present worth of $1,160,000 budget and operations revenue and $1,840,000 property taxes through 2005 (HRPI).

Environmental Setting

Fisherman's Terminal, which has approximately 400-500 fishing vessels, is contiguous with the considered Commodore Way site. This is one of the largest fishing fleets in the United States' Pacific Coast. Many of the businesses in the Commodore Way area service these fishermen.

A petition signed by 1200 employers and employees represented by the directly-affected area above, states intense objection to the location of a sewage treatment facility at the Commodore Way site. The Salmon Bay Improvement Association has been organized to oppose the use of Commodore Way for a sewage treatment facility. Their view is summarized as follows:

> "There is intense concern and objections on the part of the affected industrial community as reflected in petitions and letters. Some 1,200 signatures of employers and employees represent only the directly affected area. At this writing, the Association has refrained from introducing the petition to surrounding areas, such as Magnolia, Queen Anne, Interbay and Ballard. Nevertheless, it is our opinion that a very substantial majority of citizens in these communities would be irrevocably opposed to the utilization of the 57 acres of West Commodore Way for a sewage treatment facility.
>
> The proposed sewage plant would virtually destroy a highly developed business area with resulting increase in unemployment.
>
> The service and supply base for the Washington and Alaska fishing fleets would be seriously diminished.
>
> The cost of condemnation, removal and relocation, together with very substantial tax revenue loss would place the unjustified burden on all King County taxpayers.
>
> The present development is highly compatible with the marine environment, the developing waterfront parks and the growing tourist movement through the area.
>
> The cost of an odor-free, error-free facility must be weighed and considered against the cost of a plant located where natural factors would take care of safety and environmental problems."

Many businesses have written letters of disapproval of this location and prefer expansion of the West Point site, with comments like the following:

Environmental Setting

1. "To replace the existing plant, including the relocation of our business and other businesses, would be the largest waste of taxpayers' money this area has ever seen.

   The bureaucrats do not use any normal sense of logic to keep their empires alive. They are disregarding all cost to disrupt an irreplaceable community." (Pride & Suther, Inc.)

2. "The many industrial and business firms and their several hundred employees uprooted by such an ill-conceived plan would suffer irreparable financial hardship. In all likelihood many of the businesses would choose to go out of business rather than go through the rigors of relocating. Many of the workers would find it necessary to move their families to stay with a relocating business and others would necessarily seek other employment--possibly in another neighborhood or city or even another state.

   The costs to the taxpayers and the subsequent loss of taxpaying property to proceed with condemnation makes little economic sense when considering the obvious route of expanding the West Point facilities.

   Realizing there are a few very vocal groups objecting to such an expansion as being damaging to Discovery Park, I think we taxpayers must draw a line as to what extent we will spend public money for the preservation of esthetics! An economic and esthetic balance must be struck and I say we do it here by sharing the park." (Associated Engineers & Contractors)

3. "Our company serves both the commercial and pleasure boat market in the marine field. Approximately five years ago after exhaustive research we chose this particular location to serve as a base of our operations. Our study showed the Commodore Way area to be unique to our needs in that it enables us to serve both the commercial and pleasure boat customer, as well as industrial accounts from one location that serves as a warehouse, sales and office facility.

   The needs of our clientele require an almost immediate proximity to them by a company such as ours. We feel that the growth and expansion enjoyed by this Company is proof that our decision was correct." (Marland Enterprises Corp)

4. "The damage to the Salmon Bay Terminal may be irreparable inasmuch as the commercial fishing industry has for years been looking to the Interbay business community for important services and supplies.

   Several of the most important basic fishing equipment supply firms are located in Interbay and in the event that the Metro plan is adopted, these service and supply firms would have to relocate, possibly outside King County. The expense and risk of relocating all of these firms would be enormous and permanent damage to the Salmon Bay Terminal port facilities could be the end result." (Anon Plarex Inc)

5. "This area has important suppliers to the fishing industry and the fishing vessels. These suppliers include: refrigeration companies, shipyards, marine supply companies, instrument companies, fish processors, oil companies, repair shops and moorages. Without the suppliers, many vessels would be forced to leave Seattle.

   Many of the offices of fish processors with plants in Washington and Alaska are located in the Commodore Way area. They are so located because of the proximity to their vessels at Fisherman's Terminal and the availability of supplies and shipyards.

   There is no other suitable location in Seattle for companies mentioned above which would allow them to properly service the fishing vessels." (Seattle Marine & Fishing Supply Co)

6. "Whitney-Fidalgo Seafoods, located on the water side of Commodore Way, directly opposite the proposed sewer plant, is handling millions of pounds of fresh and frozen salmon over our docks, in the ship canal, and by truck. We have a four million pounds cold storage, 100,000 pounds of sharp freezing and employ 50 people year round for this operation only.

   We can hardly believe it possible that any individual or group of individuals would have the temerity to even suggest the use of Commodore Way site." (Whitney-Fidalgo Seafoods)

Citizen opinion surveys were conducted by HRPI and Gerhardt Research in the Magnolia region.

Environmental Setting

When 377 randomly chosen citizens were asked, in a Gerhardt survey of adjacent areas, what environmental concerns needed most attention, most responded that they could think of none. Those who did have an environmental concern mentioned such things as park upkeep, heavy traffic on streets, noise, or litter. Although a few mentioned water quality, none directly pointed out any of the wastewater treatment facilities as a most serious environmental problem.

Although most of the 377 persons interviewed knew of the treatment facilities (about 89%), they concerned few (10%). When asked if they would favor upgrading sewage treatment facilities as required by the law, the majority said "yes" (60%). Most who opposed were concerned about cost, necessity, or location of the facility. The highest number (42%) felt that "cleaning up the environment" was the most important compared to such local issues as the appearance of Discovery Park (15%) or hiding of facility (6%). The general concensus towards upgrading or expansion of the facilities was cautious acceptance. One man saw it as a "necessary evil".

HRPI (Metro's socioeconomic consultant for the EIS) and Metro's community involvement staff conducted informal meetings which were attended by citizens of the Magnolia area explicitly concerned about the water treatment facility. In general, this group felt more strongly than those randomly interviewed by Gerhardt Research, that West Point is not well located. They felt that wastewater facilities should not be adjacent to prime park land, but rather in industrial regions. All groups were willing to put up with the facilities, and felt that monetary constraints hindered relocation. The question of expansion was debated both ways - people seemed to either strongly favor it or strongly oppose it. There was sentiment that if expansion occurred on the West Point site, this facility's placement would be more permanent, and there would be less chance of later phasing out the use of this prominent point in the future. At West Point, residents also complained that the fence north of the treatment facility was too close to the beach, so at high tide people could not use this beach. There was also opposition to the sludge lagoon at West Point.

Most were unaffected by the sludge trucks, but some were opposed to their noise on residential streets.

Most groups interviewed were supportive of "Metro's effort to make treatment of waste overflow at 200 places in the interceptor lines at least as high a priority as the federal and state requirement of secondary treatment". Those representing the West Point area said, "Seattle residents would probably be willing to pay for 'some' extra on their sewer bill to alleviate this problem" (HRPI, 1976; Clear Water Watch, 1976).

Economics and Costs

A major economic consideration relates to the possible development of the Interbay (Commodore Way) site. This site is an option but not the site evaluated for costs and other feasibility, in Alternative G. This site currently is developed by 60 industries, many of which depend on their placement at the Commodore Way site to establish their clientele with close-by seafood-related businesses. If the Commodore Way site was condemned for a sewage treatment facility, 700-800 jobs would be displaced. Many of these businesses may not be able to relocate. The cost of purchasing the land in this site has been estimated at $19.4 million (HRPI, 1976) More details on the Commodore Way site are mentioned in the Regional document under Alternative G, which considers this site and in the West Point EIS (this document) under Environmental Setting and Alternative G.

A description of how costs are determined is developed in the Regional EIS. In summary, costs, whether existing or proposed, include three components: capital cost, operating and maintenance costs, and total annual costs.

The capital costs include the initial expenditures for construction of wastewater treatment plants, sewage collection systems, effluent disposal methods, combined sewer overflow facilities, sludge handling and disposal techniques, plus the purchase of land and miscellaneous treatment-related equipment. These capital costs typically are major expenses that are made infrequently and that can be phased to suit planning requirements. Because capital or construction costs can require large sums of money at one time, they are often financed by bonds or other types of loans that are paid back, with interest, over a period of several years. The yearly payment on the original capital cost debt is referred to as the annual cost of capital or amortized cost.

Operation and maintenance costs include expenses such as wages for labor, purchase of chemicals and power, and replacement or repair of equipment. These costs occur continually or at frequent intervals during the life of the project.

The total annual cost of wastewater facilities is the sum of the annual payment on amortized capital and the annual operation and maintenance costs. The payment of total annual costs can be achieved by various means, including charges to persons who use the services.

Since user charges are determined regionally, they are discussed in the Regional EIS.

Social, Recreational and Cultural

Discovery Park, located above the West Point wastewater treatment facility, was acquired in 1972 from the Fort Lawton Military Reservation for development as a major urban open space park. The primary purpose of Discovery Park, as envisioned in the Master Plan for its development, is to provide an open space of quiet and tranquility for the citizens of Seattle. Currently comprising close to four hundred (400) acres it is anticipated that the City will acquire additional Fort Lawton property by early 1977 bringing the total site acreage of Discovery Park to about five hundred (500) acres. It is anticipated that all of the remaining Federal properties within the larger Discovery Park area will be acquired for park development by 1985.

The primary character of the Discovery Park site is that of an urban open space park with meadowlands, forested areas, thickets, and two (2) miles of beach front, all with magnificent vistas of the Puget Sound basin and the Olympics beyond. Within the Discovery Park site it is proposed that at least two (2) high intensity use areas will be developed as compatible features of the overall park plan. One of these areas is the United Indians of All Tribes Cultural Center located on a twenty (20) acre site in the northwest section of the park. The other high intensity use area is the Fort Lawton/Discovery Park Historic District occupying roughly thirty-five (35) acres. Proposed development of Discovery Park is shown in Figure 2-11 .

If the Commodore Way site were selected for a sewage treatment plant, a distinct seafood-related business community would be greatly disrupted.

1. "Commodore Way and Salmon Bay Terminals together form a unique community composed of moorage and business support facilities for the fishing industry, facilities which are irreplaceable as far as alternative locations in Seattle are concerned. It is clear that removal of this large industrial tax community, just to be replaced elsewhere, is a totally irresponsible scheme." (Vita Food Products, Inc)

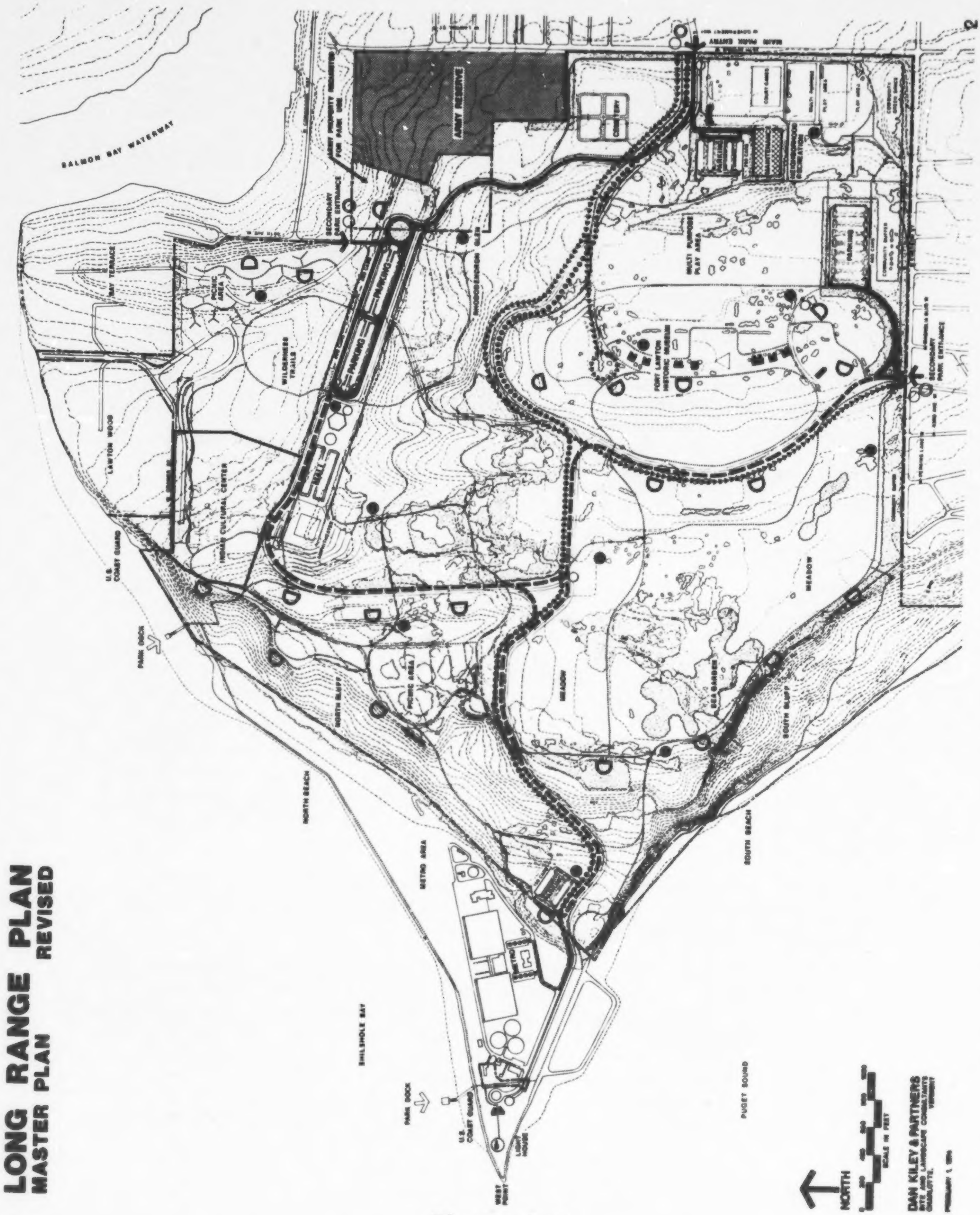

LONG RANGE PLAN
MASTER PLAN REVISED
SALMON BAY WATERWAY
ARMY RESERVE
CEMETERY
SECONDARY PARK ENTRANCE
MAIN PARK ENTRY
BAY TERRACE
PICNIC AREA
WILDERNESS TRAILS
LAWTON WOOD
INDIAN CULTURAL CENTER
PARKING
MULTI PURPOSE PLAY AREA
FORT LAWTON HISTORIC DISTRICT
MEADOW
U.S. COAST GUARD
PARK DOCK
NORTH BLUFF
SOUTH BLUFF
NORTH BEACH
SOUTH BEACH
METRO AREA
SHILSHOLE BAY
PUGET SOUND
LIGHT HOUSE
WEST POINT
NORTH
SCALE IN FEET
DAN KILEY & PARTNERS

Figure 2-11
Discovery Park Master Plan

2. "We are indeed proud of the fact that in late 1941 our company established a terminal facility in the Commodore Way area, and that over the years we have had a part in bringing new industry into this area and thus assisting in developing a viable and healthy business environment. We are now concerned with the possibility that the Commodore Way-Interbay area may be chosen as a site for a proposed sewer treatment plant; in such event, our company would find it extremely difficult to relocate our plant facilities elsewhere" (Time Oil).

Archeological and Historical

"The West Point Treatment Plant site is currently occupied by several existing Metro plant structures and, as such, the area has already witnessed considerable surficial disturbance. Development in those portions of this site which presently contain treatment facilities would not result in any further adverse impacts to archaeological remains. It would appear, however, that the North Beach portion of the site has not been the focus of any extensive past development. This coupled with the area's favorable environmental circumstance for aboriginal exploitation leads us to the following recommendation. Should any future development or disturbance be anticipated in the North Beach area, we would strongly suggest that the area be first examined by an archaeologist to ensure that no archaeological resources would be affected.

The Commodore Way alternative site is located within an intensive band of development. Because of the nature of current and past land use, it is highly unlikely that any as yet unknown significant archeological remains would still be intact. We therefore have to conclude that any proposed development of this site would not result in adverse archeological impacts.

The Garbage Dump Alternative Site is presently occupied by the Interbay Golf Park. Several other structures are situated in the southern part of the site. Importantly, most of the area is built up from garbage land fill some 30 feet above the adjacent grade. Again, because of past and present land use in this immediate vicinity, we would anticipate no adverse impacts to any significant archaeological sites." (Jerry Jermann, Director, Office of Public Archaeology, University of Washington, 1976).

Recognized historical or cultural sites include the West Point lighthouse, Fort Lawton, and the Hiram M. Chittenden Locks. None of these should be affected by any of the alternatives. In addition, the North Beach portion of the site was filled when West Point was constructed (Metro 1977), so no further adverse impacts on archeological resources would occur, contrary to the description above.

Health and Safety

Health and safety consideration relative to the Metro Facility Plan include:

- Occupational safety
- Public health and safety related to the various treatment facilities
- Existing health effects of combined sewer overflows
- Sludge Handling
- Various construction areas such as the storage and transport of explosive or caustic chemicals

The West Point occupational safety record is good compared to national rates for sewage system workers and is generally in compliance with all applicable regulations.

The public health and water quality implications of sludge handling are described in the sludge management and groundwater portions of the Regional EIS.

There may have occasionally been health risks from eating the shellfish collected along the shoreline close to the West Point outfall, which is described in the biological section of this EIS.

Aesthetics and Nuisance

The West Point wastewater treatment facility has been well designed for consideration of aesthetics. It lies low, is clean, and is surrounded by grass; few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs.

Installation of a facility at the Golf Park site would be a nuisance. In excavation of the garbage which accumulated for 20 years, it is feared that odorous sulfur dioxide and methane gas would be released, and that when in operation, the facility would still release odors. The plant would set in a valley which all local residents would look down upon. A facility at Commodore Way would probably exert similar nuisances after installation.

Installation of a facility at the Commodore Way site would be a nuisance, as expressed by businessmen in the adjacent areas.

1. "We have visitors by the hundreds--buyers of fish, fishermen, businessmen, tourists, and friends looking over this facility. If they should ask what's across the street from our operation and we would reply "a sewer plant", does anyone feel this would be an asset for handling food products? The federal government would probably prohibit the use of these facilities for preparation of fish for human consumption if the sewer was here." (Whitney-Fidalgo Seafoods, Inc.)

2. "We have approximately 140 boats, and offer haul-out facilities to commercial and pleasure boats. Our moorage tenants express amazement and disbelief when told of a possible sewage treatment plant next door and are reluctant to remain, if they and their guests must board their boats in the vicinity of a sewage plant and the associated stigmas. Still more serious, a portion of our property is undeveloped and RM zoned. A treatment plant on Commodore Way would have a very negative impact upon the value of this property." (Lockhaven Marina, Inc.)

Construction activities at West Point of any sort would be expected to exert some degree of impact on the aesthetics, and considerations are dealt with in great detail in the Facility Plan (Metropolitan Engineers, 1977) and in the appendix to Task Report D-3 (Metropolitan Engineers, 1976).

Construction at the other two sites, likewise, would be aesthetically displeasing. At Commodore Way, this effect would not stand out as much because of the existent industrial character of the surrounding region.

CHAPTER III

ALTERNATIVES AND IMPACTS

In this chapter, the alternatives and their impacts are discussed in detail. The impacts of each alternative, both primary and secondary, on the physical, biological and human environments are discussed after a brief description of the alternative. Other issues related to each alternative such as mitigating measures and unavoidable adverse impacts are also discussed. A general statement of the Facility Plan objectives and the major issues involved, description of the methodologies in selection of alternatives, and flow and waste reduction measures are also discussed briefly below.

GENERAL

In order to assist in the selection of an environmentally sound and cost effective wastewater management alternative for Metro's Service Area and to encourage public involvement in the selection process, the alternatives developed in the Draft Facility Plan (Metropolitan Engineers, 1977) are described briefly in this chapter and evaluated in terms of environmental impacts and relation to the planning objectives of the study area. These objectives as identified in the facilities plan include: (1) provision of capacity to serve the wastewater needs of the area through 2005; (2) protection and/or enhancement of receiving water quality; (3) adherence to the goals and/or legal requirements of PL 92-500; (4) control of combined sewer overflows and; (5) development of effluent and sludge reuse.

The environmental impacts of the alternatives discussed in this chapter cover all of the elements of the environment discussed in Chapter II. However, emphasis will be on the following issues as related to West Point:

(1) The effects of alternative treatment processes (primary, enhanced primary, and secondary) and combined sewer overflow controls on water quality, aquatic ecosystems,

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and public health;

(2) Social, economic, and public health effects of sludge handling and disposal methods;

(3) The aesthetic, social and legal compatibility of the alternatives with neighboring activities, land uses, community goals, comprehensive plans, and special codes;

(4) The identification of any groups which might bear an undue portion of the costs in relation to the benefits they receive;

(5) The social and aesthetic benefits versus the economic cost of moving the West Point facilities to Interbay.

(6) The effects of allowing greater public access along the shoreline by moving the fence back along the north shore.

In addition to the discussion of the primary and secondary impacts of the alternatives, other issues pertaining to each alternative such as unavoidable adverse impacts, measures that can be employed to mitigate the adverse impacts, and irreversible and irretrievable commitment of resources will be discussed for each alternative and compared to the other alternatives.

DEVELOPMENT OF ALTERNATIVES

All the major issues addressed in the discussion of the regional alternatives are pertinent in the selection of options available to the West Point treatment plant. Since West Point is the largest Metro facility and functions as a regional treatment center, regional issues include treatment processes, combined sewer overflow control, and sludge handling and disposal. On the local level, access, noise, traffic, visibility, odors, and the availability of land for expansion dictated by the secondary treatment requirements are all sensitive issues. Although the West Point plant was originally located in an area buffered from residential uses by a military base, the conversion of the base to park land and the recently imposed restrictions on shoreline fill have restricted the available avenues for expansion.

The variation in service area tributary to West Point treatment plant is a consideration which affects the size of the plant, the site area required, and the frequency and volume of combined sewer overflows. The North Lake Washington area, which is projected to develop by the year 2005, was originally planned to discharge into the West Point collection system under the comprehensive plan. Deleting it, partially or totally, from the West Point service area would reduce the requirement for future expansion for secondary treatment at West Point and would reduce the combined sewer overflow. Other options for reduction of the West Point service area include the provision of a new treatment plant in the Duwamish area. Enlargement of the West Point service area would mainly result from the abandonment of Carkeek Park or Alki and the transfer of these flows to West Point. Except for the addition of some interceptors required due to the deletion or addition of certain service areas, the present collection system pattern would be maintained.

Because of the constraints involved in expansion at West Point, various alternative sites were identified for phasing out the plant by the year 2005. The abandonment of the West Point treatment plant in the near future was considered not feasible and impractical for financial and engineering reasons. The alternative sites for relocating the plant were selected in the Interbay area. The selection of the Interbay sites was made based, primarily, on access to the existing North trunk sewer line and also on potential availability and existing land uses. The number of sites in Interbay was reduced to two: Commodore Way and Golf Park/ Garbage Dump. Both Interbay sites are subject to odor, visibility, and traffic constraints, with the garbage dump site being situated between two residential hillsides. Poor air circulation in the Interbay Valley may make odors a prominent concern. Construction at Commodore Way could involve expensive condemnation proceedings and would remove a portion of the community tax base.

The question of relocating West Point involves several tradeoffs since not all objectives can be met with a single alternative. For example, relocating (or at least not expanding facilities) at West Point could allow greater recreation use and better aesthetics at Discovery Park and the beaches at West Point. At the same time, the construction and operation of a new plant in Interbay would affect residents' land uses, odors, the tax base and other factors there. The economic feasibility or advisability of relocating the West Point treatment functions must also be considered. An economic analysis of moving the West Point treatment plant concluded that relocation is not justified because costs (for destroying West Point, acquiring new land and constructing comparable primary treatment facilities) would exceed the benefits (to recreation), even with assumptions designed to compare minimum possible costs with maximum possible benefits (HRPI, 1976). If costs of providing transfer piping to accommodate the plant siting change were added, the results would be even less favorable for relocation.

Although the assumptions of the HRPI study have been questioned, a conclusion that costs of constructing an entire new facility at Interbay would be more than adding secondary treatment to West Point seems reasonable.

Sludge handling options at West Point are the result of a regional system approach. The options include the continuation of the present practice whereby sludge from the other Metro plants, except Alki, is processed at West Point, full separation of sludge handling, or provision of a central sludge handling facility at a location other than West Point. Other issues to be considered are sludge transport methods, ultimate disposal and potential reuse. The present sludge management system was adopted in the Facility Plan as an interim solution until further investigation is made regarding the options cited above.

In selecting the treatment process options ,three different treatment objectives were considered: (1) maintaining the existing level of primary treatment; (2) improving solids removal by enhanced primary treatment; and (3) upgrading treatment to the legally required secondary treatment standards.

Interim studies indicated that there is a potential for onshore current during the summer months which could bring diluted effluent on or near shore. Since existing primary treatment produces somewhat reduced solids removal performance during the summer months, it was determined that a program focused on summertime solids removal with associated removal of floatable, metals, viruses, and others could be useful. Thus an enhanced primary treatment mode was devised including optimization of existing treatment systems in the wet season by pretreating supernatant (recycle streams) and full physical/chemical alum treatment during summer months. The selection of alum, rather than lime, was based on results from pilot plant studies in which lime was found to be more expensive and less effective than alum.

For achieving secondary treatment standards, several different processes were considered. These were physical-chemical, tower trickling filters, rotating biological contactors, activated bio-filters and air or oxygen activated sludge. Single stage physical-chemical treatment did not achieve required BOD removals. The only one which reliably meets the combination requirement of 85 percent removal in dry weather and 30 mg/l for biochemical oxygen demand (BOD) and suspended solids (SS) in wet weather without excessive costs or the addition of an expensive second step in the process is activated sludge. Second best for reliability and cost are tower trickling filters followed by granular filtration. Because tower trickling filters consume less land area than activated sludge, they remain a sub-option under some alternatives at West Point. However, a serious reliability problem is associated with trickling filters.

In addition to the alternatives addressing the regional and site issues, a no action alternative has been considered as required by the Washington State Environmental Policy Act. As a more realistic or modified no action alternative, the continuation of the 1958 Metro Comprehensive Plan was considered as an alternative, allowing the comparison of present policies and their impacts against the required action.

Although cost is an important constraint in evaluating these alternatives, it is a regional, rather than a local, issue. Due to the Metro uniform wastewater pricing policy, the cost allocated to West Point residents does not reflect the cost of West Point facilities alone, but is West Point's share of the total cost of the regional wastewater management system. Still, cost is more of concern here than elsewhere because the West Point treatment plant is the largest and most expensive component of the regional system. The investment sunk in existing facilities, both treatment plant and collection system, and the need to select alternatives eligible for federal and state funding are important considerations.

Flow and Waste Reduction Measures

Prior to the development of wastewater management alternatives and sizing of various transport and treatment systems for projected future loading requirements, measures for potential flow and waste reduction were investigated in the facilities plan. Such measures, if found acceptable and economical, could decrease system operations and maintenance costs, extend the useful life of wastewater collection and treatment facilities, and reduce the size and therefore the costs of future facilities. Flow and waste reduction measures include the following major items: (1) domestic water conservation techniques; (2) collection system rehabilitation to reduce infiltration and inflow; and (3) industrial pretreatment of wastewater. Industrial waste reduction, in both volume and strength, can also reduce loads on present and future facilities and prevent the introduction of toxic or undesirable pollutants into the wastewater stream where they may disrupt treatment processes or contaminate either the discharged effluent or the waste residuals.

Domestic Water Conservation

As discussed in the Regional Report, Volume I, the reduction in wastewater flows through adoption of domestic water conservation and reuse measures, is insignificant in a combined service system such as West Point with high rate of infiltration/inflow. At West Point a 25 percent decrease in domestic water use would only change the peak flow, on which secondary clarifiers would be sized, by 3 percent. The change would not affect design of the secondary aeration tanks, since these are sized on peak solids loads, which would not be affected by water conservation.

Infiltration and Inflow

Infiltration and inflow (I/I), which include seepage into collection systems and storm drain flow, can add considerably to the volume of the wastewater in a sewerage system and hence increase the cost of wastewater transportation and treatment. PL 92-500 (Title II, Section 201(g) (3) (4)) requires applicants for treatment works grants to demonstrate that sewer systems tributary to those treatment works are not subject to excessive infiltration/inflow. Excessive I/I is defined as the quantity of infiltration/inflow which can be economically eliminated from a sewer system by rehabilitation as determined by economic analysis that compares the costs for correcting the infiltration/inflow conditions with the total costs for transportation and treatment of the infiltration/inflow.

In compliance with the federal act, a detailed infiltration analysis (Metropolitan Engineers, 1977) was conducted on sewerage systems tributary to the Metro West Point wastewater treatment plant. The results showed that the system infiltration varied from 25 mgd during the summer season to a maximum of 90 mgd during the peak of the rainy season. In comparison, the domestic and industrial/commercial wastewater average daily flows are estimated at 34 and 22 mgd, respectively. Thus, during dry weather in Seattle, infiltration to the West Point plant constitutes 30 to 45 percent of the minimum dry weather flow of 70 to 90 mgd; in wet weather, infiltration/inflow contributes 55 to 85 percent of the total peak 350 mgd flow. Inflow analysis was also conducted consistent with EPA Program Guidance Memorandum 61 for those areas tributary to West Point and served by separate sanitary sewers.

Although the infiltration to the overall collection system is appreciable, it was concluded that it was not excessive, that is, rehabilitation costs are higher than transportation costs for modifying the collection system. The infiltration in Lake Forest Park collection system was found excessive, however, and infiltration can be reduced by 0.6 mgd on a yearly average.

Inflow into the separate sewer systems was evaluated under a separate study which determined the cost-effectiveness of inflow control measures. Since roof drains connected to the sanitary sewers are a major source of inflow, the City of Seattle and other agencies in the West Point service area adopted building codes which prohibit new construction from connecting roof drains to the collection system. Approximately 30 to 70 percent of the "roof drains" inflow is street drainage, so not all inflow could be eliminated by roof drain controls. Other measures that can be adopted to reduce future I/I would be the provision of efficient storm water collection facilities and sealed storm water transfer lines and ditches, which will reduce the possibility of these waters entering the sanitary sewer system. Points at which storm sewers and surface drainage ditches cross sanitary sewers have been sources of infiltration/inflow. Local ponding, in addition to being a potential inflow source, causes upper groundwater tables to become a potential infiltration source. Elimination of these sources of I/I would reduce the flow reaching the treatment facility, but not of the magnitude needed to prevent combined sewer overflows.

Pretreatment

Treatment to remove or reduce pollutants at their source before they enter the common sewerage system is known as pretreatment. It can reduce mass pollutant loadings on facilities, and prevent the introduction of pollutants which might disrupt the treatment process and contaminate the discharged effluent or the waste residuals. Pretreatment efforts generally focus on industrial or commercial contributors.

Pretreatment requirements of industrial wastewater are governed by federal, state, and local regulations and laws. Industries discharging to Metro's collection systems or directly to a body of water must comply with requirements of the National Pollution Discharge Elimination System (NPDES) permit which sets limitations on the concentration and amount of pollutants discharged. Detailed information on the NPDES permit and other regulations can be found in Chapter III of the Regional EIS, Volume I, and the Facility Plan documents.

Most of the industrial waste generated in the Seattle area is discharged to the West Point collection system. The industries are diversified and include food processing, chemical production, and metal plating, among others. To assess the contribution of industries to the pollutant loads and the potential benefit of pretreatment, a rough metal calculation was made of metal sources to the West Point treatment plant influent from industrial sources, the water supply system and urban runoff (Metropolitan Engineers, 1976). It was concluded that except for lead, industries are the major sources of heavy metals in wastewater in the West Point service area, which is shown in Table 3-1. Although definitive requirements by the EPA for pretreatment have not been finalized, the merits of pretreatment for specific industries discharging into Metro sewer system could be justified at West Point. Metro presently has an industrial user charge system and regulations for industries discharging to its system. More stringent pretreatment requirements, however, alone or in combination with secondary treatment would reduce the heavy metal loads to Puget Sound. Sludge quality also would improve by pretreatment and the potential for its re-use could be enhanced.

Beneficial Use of Reclaimed Water

Title II, Section 201 (g)(1)B of PL 92-500 states that applicants for treatment plant construction grants should satisfactorily demonstrate that "the works proposed for grant assistance will take into account and allow to the extent practicable the application of technology at a later date which will provide for the reclaiming or recycling of water or otherwise eliminate the discharge of pollutants."

In order to assess the possibility of reclaimed water re-use in the service area, the potential market sites for re-use and the corresponding water quality must be defined. The water quality and consequently the degree of treatment required must comply with the policies and objectives of local, state, federal and health agencies. At the present, treated effluent from West Point is discharged to Puget Sound.

As was concluded in the Facility Plan, it is highly unlikely any extensive water reclamation would be justifiable in the Seattle metropolitan area, where abundant local sources of high quality water offer much greater potential at a markedly lower cost. This is particularly true in the service area near West Point, which is already developed.

As it applies specifically to the West Point service area, there are some industries with the potential for effluent re-use. The reclaimed water quality requirement for these uses is expected to be that attained by secondary treatment as a minimum.

REGIONAL ALTERNATIVES

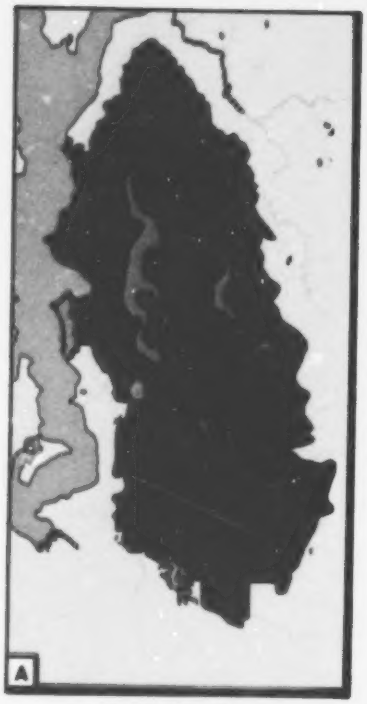
Eight alternatives on the regional level are being considered and evaluated by the 201 Facility Plan. These alternatives differ in the degree to which issues such as cost, water quality, and compliance with federal and local policies and goals are addressed. The regional alternatives consist of one no-action alternative, one alternative which continues unchanged the present comprehensive plan for the study area, two which emphasize combined sewer overflow abatement with minimal treatment upgrading, and four alternatives which achieve secondary treatment with variations on combined sewer overflow controls, site impacts and re-use options. The secondary treatment alternatives E through H are the only alternatives that comply with the secondary treatment requirements of PL 92-500. The eight alternatives are described below and shown in Figure 3-1.

Alternative A - No Action

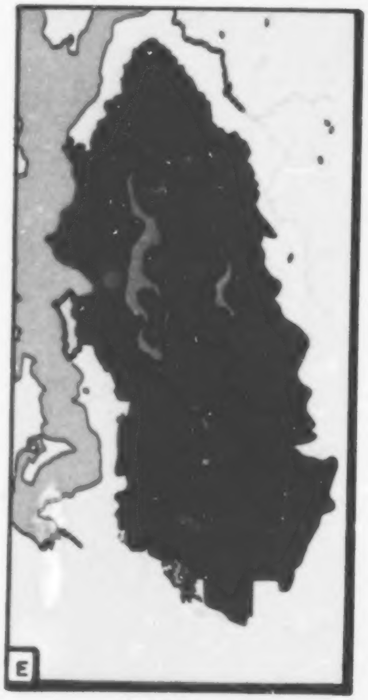
No capital expenditure would be made for expansion, modification or upgrading of treatment plants and no construction of new interceptors during the planning period (until 2005). Alternative A is evaluated to meet SEPA no action requirements.

Alternative B - Metro Comprehensive Plan
(No Action Pursuant to PL 92-500)

Plant upgrading and transfer interceptor construction would be done according to the Metro Comprehensive Plan. Alternative B is evaluated as the no action alternative pursuant to PL 92-500 and NEPA requirements and,as the Metro Comprehensive Plan, serves as the baseline for other alternatives. Puget Sound plants (West Point, Alki, Carkeek Park and



NO ACTION



SECONDARY

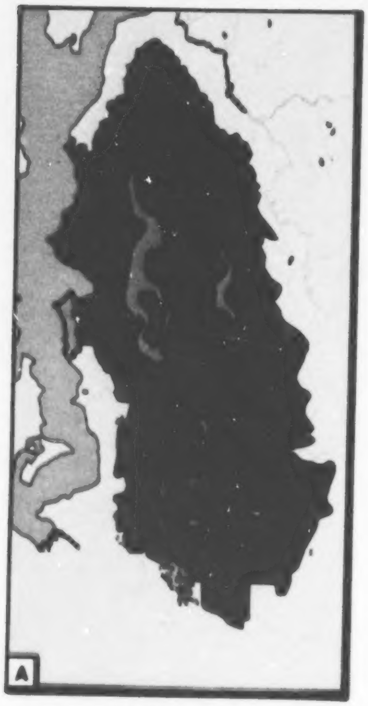
LEGEND

- ■ RENTON
- ■ WEST POINT
- ▨ DUWAMISH (STORMWATER)
- ■ DUWAMISH (WASTEWATER)
- ░ ALKI
- ■ RICHMOND BEACH
- ■ CARKEEK PARK
- ■ NORTH LAKE WASHINGTON
- ■ NORTH LAKE SAMMAMISH
- ░ SOUTH LAKE SAMMAMISH
- ▨ PRESENTLY SERVED BY OTHERS

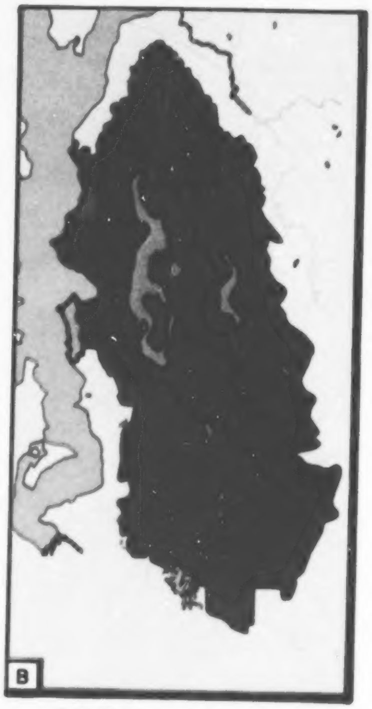
- ● WASTEWATER TREATMENT PLANT
- ○ STORMWATER TREATMENT PLANT

Figure 3-1

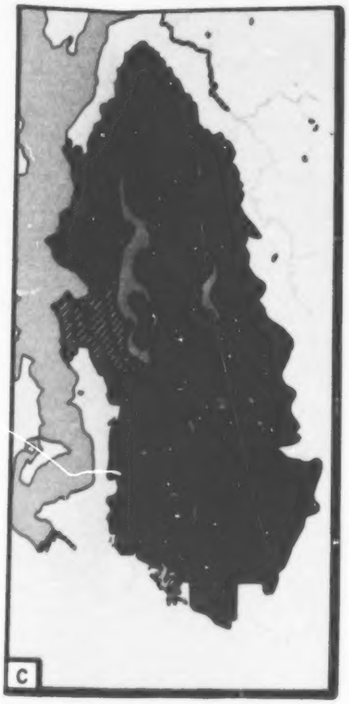
Metro 201 Facility Plan
Service Area Alternatives



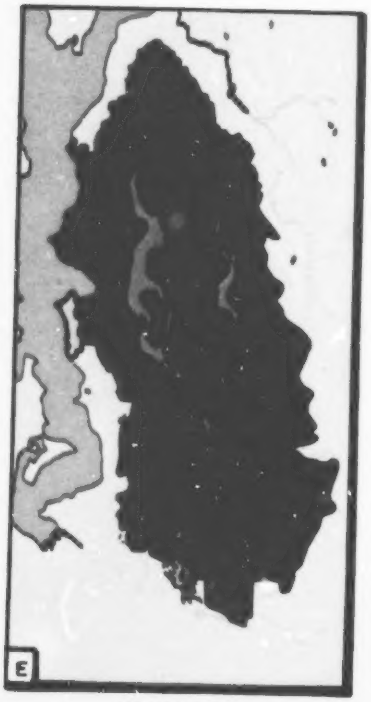
NO ACTION



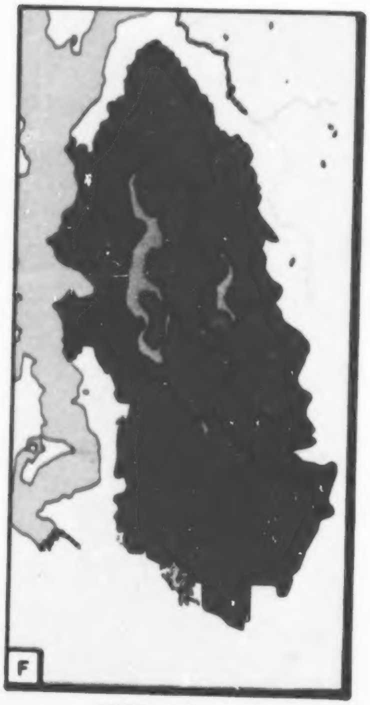
COMPREHENSIVE PLAN
(NO ACTION PURSUANT
TO PL 92-500)



MAJOR CSO CONTROL



SECONDARY



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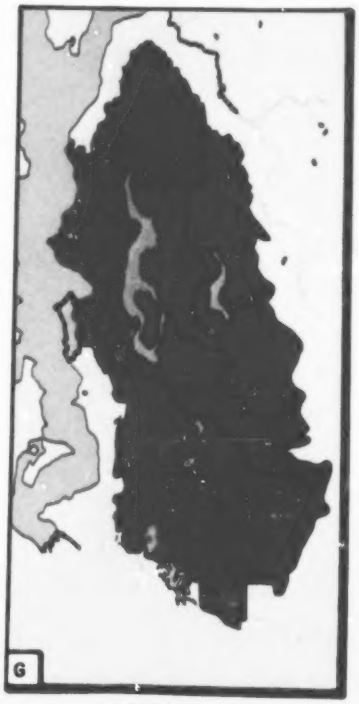
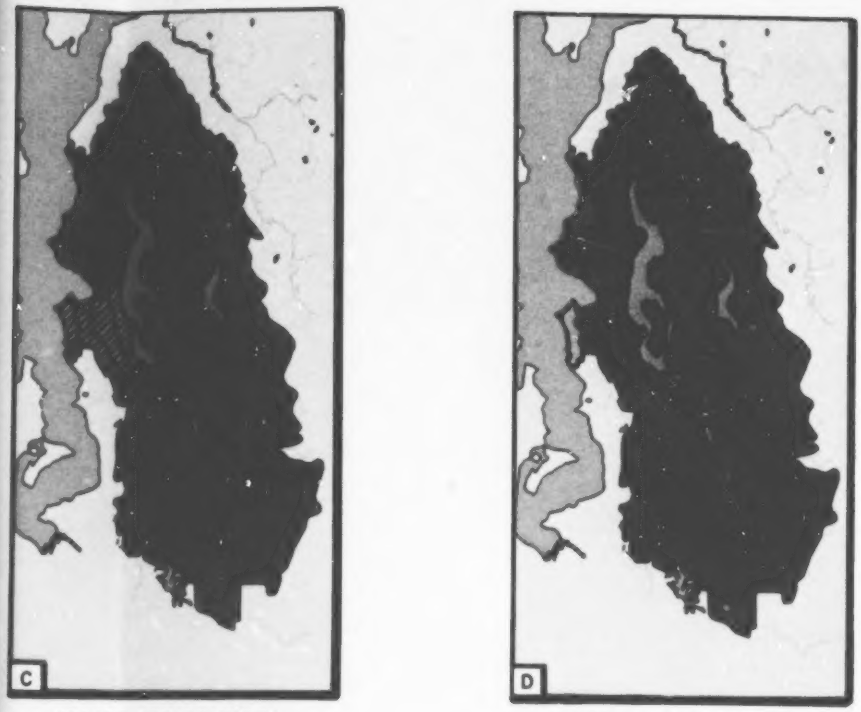
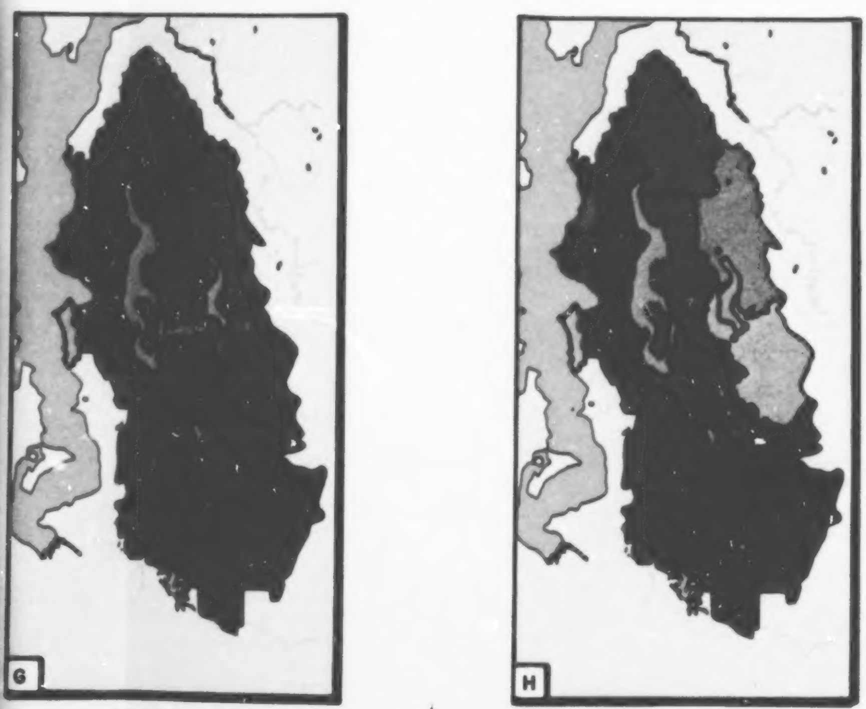


SECONDARY
WEST POINT PHASE OUT
OPTION



MAJOR CSO CONTROL

PARTIAL CSO CONTROL



SECONDARY
WEST POINT PHASE OUT
OPTION

DECONSOLIDATION
RECLAMATION

LEGEND

■ RENTON

■ WEST POINT

▨ DUWAMISH (STORMWATER)

■ DUWAMISH (WASTEWATER)

▒ ALKI

■ RICHMOND BEACH

■ CARKEEK PARK

■ NORTH LAKE WASHINGTON

■ NORTH LAKE SAMMAMISH

▒ SOUTH LAKE SAMMAMISH

▨ PRESENTLY SERVED BY OTHERS

● WASTEWATER TREATMENT PLAN

○ STORMWATER TREATMENT PLANT

Figure 3-1

Metro 201 Facility Plan
Service Area Alternatives

Richmond Beach) would be retained with primary treatment. Improved sludge management and disinfection practices would be provided in Alternative B and all following alternatives. Four new transfer interceptors and improvements to the Alki outfall would be included.

Alternative C - Major Combined Sewer Overflow Control

Major portions of combined sewer overflows would be controlled by transfer from fresh to salt water and/or treatment. The existing Puget Sound plants would be upgraded to provide enhanced primary treatment by physical/chemical treatment of solids during the summer. A new wet weather enhanced primary treatment plant would be constructed in the lower Duwamish industrial area and the Alki plant would be abandoned, both in 1995. The Duwamish plant would discharge through a new outfall to the Duwamish estuary.

Alternative D - Partial Combined Sewer Overflow Control

Wet weather combined sewer overflows would be reduced to Lake Washington, Lake Union and the West Seattle shoreline and increased to Elliott Bay. The four Puget Sound plants would be upgraded to enhanced primary treatment with chemical addition during the summer for improved solids removal.

Alternative E - Secondary

Secondary treatment would be added to the West Point, Alki and Richmond Beach wastewater treatment plants by 1985. The Carkeek Park plant would provide primary treatment for wet weather flows only beginning in 1985; dry weather flows would be pumped to West Point. Carkeek could be abandoned by 1995.

Alternative F - Secondary/Southern Strategy

Secondary treatment would be provided at Richmond Beach and West Point (with a reduced service area). A major new secondary treatment facility would be constructed in the

Duwamish industrial area in 1985; the Alki plant would be abandoned at that time. A new outfall off Alki Point would be built for discharging effluent from the Duwamish (and Renton) plants. The Carkeek Park plant would provide primary treatment for wet weather flow only beginning in 1985; dry weather flows would be pumped to West Point. Carkeek could be abandoned in 1995.

Alternative G - Secondary/West Point Phaseout Option

Secondary treatment would be provided at the Alki and Richmond Beach plants. West Point would continue as a primary treatment plant for wet weather flows only, beginning in 1985. A new secondary treatment plant in the Interbay area (Commodore Way or Golf Park sites) would be constructed. The Carkeek Park plant would provide primary treatment for wet weather flows only beginning 1985; dry weather flow would be pumped to West Point. Carkeek could be abandoned in 1995.

Alternative H - Deconsolidation/Reclamation

Secondary treatment would be provided at West Point, Alki, Carkeek Park and Richmond Beach. Areas of growth would be served by new inland plants with local effluent and sludge re-use possible. Advanced waste treatment would be provided at new North and South Lake Sammamish plants. A new secondary plant at Kenmore would discharge treated effluent to Puget Sound at Richmond Beach.

A summary of information pertaining to the West Point treatment plant alternatives is presented in Table 3-1. More details are described in the following sections on each alternative.

Table 3-1

SUMMARY OF ALTERNATIVES FOR 2005
-WEST POINT SERVICE AREA-

	ALTERNATIVES								
	A	B	C	D	E	F	G		H
							West Point	Interbay	
Treatment Capacity (dry/wet), mgd	104/350	142/350	139/350	129/350	145/350	97/350	0/350	150/200	121/350
Treatment Process	Primary	Primary	Enhanced Primary	Enhanced Primary	Secondary	Secondary	Primary	Secondary	Secondary
Date of Treatment Process Modification	--	--	1985	1985	1985	1985	1985	1985	1985
Sludge Processing*	WP, CP, RB, R	WP, CP, RB, R	WP, RB, D	WP, RB	WP	WP, RB	--	I, WP	WP, RB

*Indicates source of sludge processed at West Point or Interbay

(WP=West Point; RB=Richmond Beach; CP=Carkeek Park; R=Renton; I=Interbay; D=Duwamish)

ALTERNATIVE A (NO ACTION)

In the No Action Alternative, existing conditions would be allowed to continue as they are. No Action is considered here to satisfy a SEPA requirement. The alternative also provides the public with the environmental implications of not improving the existing wastewater management systems or not increasing the sewered population in the service area of the West Point plant.

The following sections describe the service area collection system, wastewater characteristics, flow characteristics, treatment facility, and sludge management system under the existing conditions, which would be the same as would occur until 2005 under the No Action alternative for West Point.

Service Area

The West Point wastewater treatment plant serves a population of 510,000 within a sewered tributary area of approximately 59,000 acres. The same population and service area would be served in 2005. The service area, shown in Figure 3-1, is based on the Metro Comprehensive Plan for sewage disposal adopted in 1958 and includes additional areas, primarily in Snohomish County, which were originally projected to be served. The service area is practically bisected by the Lake Washington Ship Canal which connects Lake Washington to Lake Union and Puget Sound. There are numerous small lakes, two principal rivers, the Duwamish and the Sammamish, and many creeks and streams within the service area.

Except for about 14.5 square miles of the City which fall within the Alki and Carkeek Park service areas, Seattle is contained within the West Point service area. In addition to Seattle, the area contains four incorporated cities: Lynwood, Bothell, Lake Forest Park, and Montlake Terrace.

In addition to the residential wastewater generated from the service area, a large number of industries discharge into the West Point collection system. The industries are diversified and include food processing, metal plating, chemical production, and others.

Collection System

The West Point wastewater treatment plant serves fifteen component entities of which six are sewer districts, three are a combination of water and sewer districts, and six are cities. The principal contributor of sewage is the city of Seattle. The wastewater is locally collected by the fifteen agencies and then discharged to Metro interceptors for transmission to the West Point wastewater treatment plant. The collection system is a partly combined and partly separate sewer system.

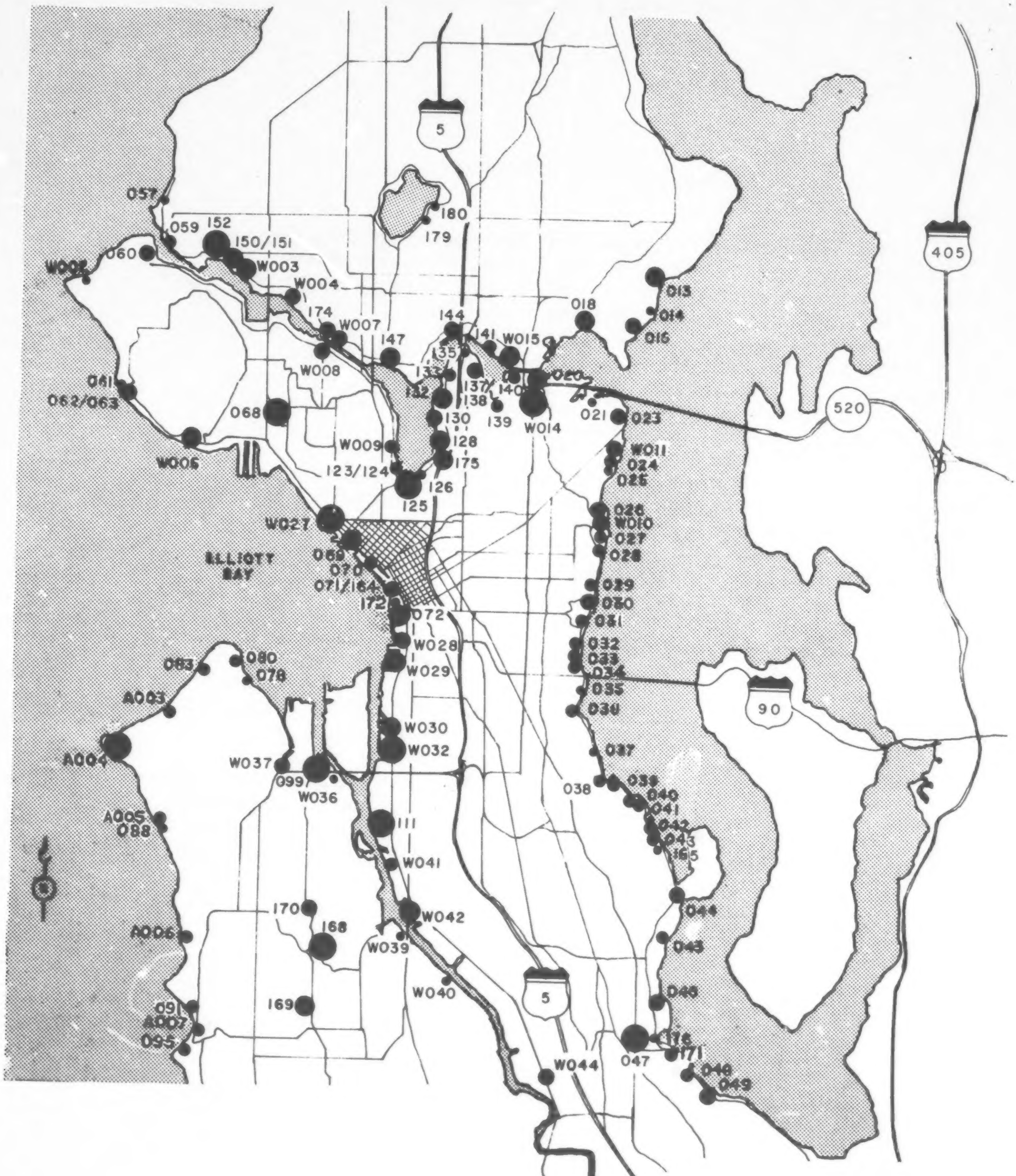
The City of Seattle was originally designed as combined sewer system, however, in the past ten years a partial separation program to remove street drainage from the sewer system has been adopted by the city. During wet weather conditions, the high infiltration/inflow still exceeds the capacity of both the local collection system and Metro interceptors, resulting in overflows of combined sewage throughout the city of Seattle. Figure 3-2 shows the location of combined sewer overflows in the Metro area. Overflows to Lake Washington, Portage Bay, Lake Union, Ship Canal, Elliott Bay, and the Duwamish River are related to the West Point service area.

To reduce the amount of and frequency of such combined sewer overflows, some in-line storage is now utilized. This is accomplished through the use of regulation stations which allows the sewers to back up the flow and temporarily store it until the peak flow due to the storm subsides. The regulation stations and their operation is controlled by a computer, CATAD, which also monitors the various parameters necessary for control.

Wastewater Characteristics

The following sections describe briefly the wastewater quantity and quality in the West Point area, the existing treatment facility and its adequacy under the present conditions.

The West Point treatment plant receives the sewage flow from the major and central part of the Seattle metropolitan area. As such, this flow is contributed to by a large variety of industries as well as a residential and commercial base. In addition, a large part of the


5
405
520
90
5
ELLIOTT BAY
057
059
152
150/151
060
W002
W003
W004
174
W007
W008
147
144
135
141
W015
133
132
137
138
140
139
W014
020
018
013
014
016
021
023
061
062/063
068
W005
130
128
175
W009
123/124
125
126
W011
024
025
W027
069
070
071/164
172
026
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040
041
042
043
165
A005
088
111
W041
044
170
168
W042
W039
A006
045
W040
169
046
091
A007
095
W044
047
176
171
048
049
180
179

Figure 3-2
Combined Sewer Overflow Locations

West Point tributary area is served by combined storm and sanitary sewers, and consequently the volume of the flow, pollutant concentrations, and loadings are greatly affected by the rainfall patterns over the region. The system also receives groundwater infiltration associated with a collection network as it begins to age and its pipes and manholes crack and leak.

Flow Characteristics

Annual variation in flow received at West Point is mostly dependent on the annual rainfall. The average dry weather flow ranges from 75 to 90 mgd. For comparison, this figure is considerably less than half the mean wet weather flow experienced during the winter of 1973-74. In that period, for the five months of November 1973 through March 1974, the monthly flow varied from 156 mgd to 196 mgd, with a mean influent flow of 170 mgd.

During wet weather conditions the maximum flow to West Point is restricted by the capacity of the north interceptor, the influent sewer to the plant. Without causing any substantial overflows upstream, the capacity of the interceptor is limited to 350 mgd. Flows to the plant, however, have been reported as high as 400 mgd. Such high flow can only occur simultaneously with massive overflows.

The monthly average organic matter content as biochemical oxygen demand (BOD) concentrations and loads vary appreciably with the season and the rainfall duration and intensity. During a typical summer, or average dry weather flow, BOD concentration is about 160 mg/l, and a typical winter monthly average concentration is about 110 mg/l with a mean for the year of about 135 mg/l. The BOD loading to the plant on a monthly average basis is about 140,000 pounds per day in the winter and 90,000 pounds per day during the summer. Peak loadings of up to 260,000 pounds per day have been reported.

Similar to BOD loading, the suspended solids vary with the weather conditions. A typical dry weather flow monthly average for suspended solids concentration is about 240 mg/l; in sustained wet weather the monthly concentration falls to about 190 mg/l with an annual mean of about 210 mg/l. In terms of pounds per day, a normal winter monthly maximum loading is about 260,000, and a normal dry weather flow monthly minimum is approximately 150,000 pounds per day. The annual average load is 213,000 pounds per day.

Alternatives and Impacts

The concentration of metals in West Point influent was monitored during the summer of 1975, for the months of June through October. Metals investigated were zinc, copper, nickel, chromium, lead, cadmium, and mercury. Average concentrations and average maxima and minima are shown in Table 3-2.

These samples represent an average metals concentration, but do not reflect shock loads of up to 100 times the peak concentrations that reach the plant at unknown frequencies, particularly of mercury.

Table 3-2

West Point Influent Metal Concentrations For 1975

Metal	Average (mg/l)	Average Minimum (mg/l)	Average Maximum (mg/l)
Zinc	0.45	0.32	0.61
Copper	0.22	0.12	0.33
Nickel	0.06	0.02	0.13
Chromium	0.10	0.03	0.17
Lead	0.11	0.02	0.55
Cadmium	0.007	0.001	0.029
Mercury	0.0005	0.0001	0.0190

Metals concentrations tend to follow a seasonal pattern, being higher in summer during the period of lower plant flows. Lead and mercury are exceptions to this general behavior, showing fairly constant concentrations throughout the year as shown by ongoing metals sampling.

Treatment Plant

The West Point treatment plant is located on a 24 acre site at West Point adjacent to Discovery Park. The site is part of approximately 80 acres owned by Metro of which almost 39.5 acres lie on filled land. Access to the plant is from the east entrance to Fort Lawton (Government Way).

The plant provides primary treatment by sedimentation that removes approximately 65 percent of the incoming suspended solids and 35 percent of the BOD. This results in average concentration in the treated wastewater of 115 mg/l BOD and 110 mg/l suspended solids.

Chlorinated effluent is discharged through a submarine outfall that extends into Puget Sound to a depth of 240 feet. The outfall consists of a 3,000-foot pipe with a 600-foot diffuser section.

Plant Adequacy and Reliability

As discussed earlier, appreciable variation in incoming flow to the West Point treatment plant is experienced due to the nature of the tributary collection system and its age. Such variation in flow has a significant effect on the performance of the treatment plant and its efficiency in removing the various pollutants in the wastewater. During moderately dry summer months, the average dry weather flow is in the order of 70 to 90 mgd which is within the design flow of the plant, 125 mgd. However, during wet weather monthly flows of over 150 mgd have been experienced for extended periods, and flows as high as 400 mgd have been reported reaching the plant. Under such high flows, the primary sedimentation tank BOD and suspended solids removal efficiency is reduced proportionally. Any decrease in solids removal efficiency will also result in proportionate decreases in the removal of heavy metals and other pollutants.

The adequacy of the West Point treatment plant in terms of heavy metals removal is shown in Table 3-3, which contains the NPDES permit performance data for 1975. The violations reported are highest for copper which violates the permit limit on a weight basis almost daily. Violations were also high for zinc, nickel, and chromium.

Table 3-4 presents the concentration and pounds of heavy metal discharged from all Metro plants. Due to its size and industrial waste content, the West Point effluent contributes 92 to 98 percent of the heavy metals discharged to Puget Sound by Metro plants.

To assess the potential reduction of heavy metals concentration in the effluent if secondary treatment was provided at West Point, the present removal efficiency at West Point is compared to removal efficiencies reported at Renton. This is shown in Table 3-5. Removal efficiencies at both plants are within the range expected for the degree of treatment provided at each plant. From the table it can be seen that improved removal efficiencies are best attained for copper, chromium, zinc and nickel.

Table 3-3

West Point Treatment Plant Effluent
1975

Parameter	Concentration					Poundage				
	No. of Except.	Permit Limit	Average	Maximum	Minimum	No. of Except.	Permit Limit	Average	Maximum	Minimum
Cadmium										
Daily	1	0.020	0.005	0.10	<0.004	14	12.0	5.02	119.60	0.01
Monthly	1	0.010	0.005	0.01	<0.004	5	5.0	5.05	7.77	2.02
Chromium										
Daily	15	0.200	0.08	0.08	<0.01	37	100.0	72.35	849.85	0.01
Monthly	1	0.100	0.08	0.28	0.04	2	65.0	72.39	246.54	45.27
Copper										
Daily	126	0.200	0.194	0.720	0.02	344	110.0	188.61	1029.82	21.35
Monthly	12	0.100	0.195	0.28	0.14	12	73.0	188.36	262.09	142.37
Mercury										
Daily	1	0.010	0.001	0.022	<0.0002	0		0.54	22.49	0.01
Monthly	0	0.005	0.001	0.001	0.0002	0		0.54	1.20	0.19
Nickel										
Daily	12	0.100	0.047	0.310	<0.02	91	60.0	47.93	267.33	0.01
Monthly	5	0.050	0.048	0.068	<0.02	6	42.0	48.02	87.49	21.61
Lead										
Daily	1	0.200	0.048	0.230	<0.02	47	105.0	55.01	439.41	0.01
Monthly	0	0.100	0.048	0.083	<0.02	3	87.0	54.88	114.53	26.19
Zinc										
Daily	38	0.500	0.35	2.400	0.13	61	450.0	341.12	2910.32	0.00
Monthly	7	0.300	0.35	0.551	0.25	11	280.0	341.20	482.08	231.47

Table 3-4
Heavy Metals Discharge From Metro Treatment Plants

	West Point Daily Avg. 1975	West Point 10-29-75	Carkeek Park 10-29-75	Richmond Beach 10-29-75	Alki 10-29-75	Total lbs/day	Renton daily average for 1975
Cadmium mg/l lb/day	.005 5.02	.005	.004 .1	.004 .055	.004 .275	– 5.40	.004 .98
Chromium mg/l lb/day	.08 72.35	.04	.01 .26	.01 .136	.01 .687	– 73.43	.011 2.70
Copper mg/l lb/day	.194 188.6	.13	.08 2.1	.13 1.77	.04 2.75	195.22	.03 7.86
Mercury mg/l lb/day	.001 .54	.0005	.0007 .018	.0004 .005	.0002 .014	– .58	.001 0.24
Nickel mg/l lb/day	.047 47.93	.06 –	.02 .5	.02 .27	.06 4.12	– 52.82	.017 4.17
Lead mg/l lb/day	.048 55.01	.08	.07 1.84	.06 .82	.03 2.06	– 59.73	.017 4.17
Zinc mg/l lb/day	.35 341.1	.33	.39 10.28	.14 1.91	.09 6.18	– 359.47	.065 15.94
yearly avg. Daily flow mgd	122.00		3.16	1.64	8.24	135.04	29.40

Except for West Point and Renton, pounds of heavy metals in the other treatment plant effluents are based on composite sample analysis done on October 29, 1975. Pounds of heavy metals in Renton and West Point effluents are for the year 1975.

For the period 1972 to 1974, BOD removal efficiency at the West Point treatment plant has been reported to vary between 33 to 45 percent while suspended solids removal efficiency was between 56 to 70 percent. Primary treatment generally removes between 25 to 40 percent of BOD and 50 to 65 percent of the suspended solids in the wastewater.

Table 3-5

Heavy Metals Removal Efficiency (Per Cent) For 1975

	West Point (Primary Treatment)	Renton (Secondary Treatment)
Cadmium	29	43
Chromium	23	84
Copper	11	95
Mercury	-	-
Nickel	20	58
Lead	56	66
Zinc	22	75

Odors at the West Point site were evaluated due to their potential for impacts.

Odors are presently controlled by prechlorination and postchlorination, by burning waste digester gas and by good plant housekeeping. There have been no complaints from the neighborhood about odors in the vicinity of West Point. This is due to good odor dispersion and the fact that there are no residences in the immediate vicinity of West Point. During storms, flows in excess of plant capacity usually overflow at combined sewer overflow points to Lake Union or the Duwamish. Only infrequently do excess flows bypass the plant to Puget Sound.

Information on chlorine residuals is important in analysis of impacts on biology. Chlorine is applied to the effluent on a residual-paced basis. The residual, however, is measured a short distance downstream of the chlorine feeding point and, while allowances for contact time are made, does not reflect the actual chlorine residual before discharging into Puget Sound. The chlorine contact time is accomplished in the outfall for the most part since a chlorine detention tank is not provided. Therefore the exact chlorine dosage required to provide adequate disinfection, and the extent of disinfection in terms of number of bacteria remaining or residual chlorine cannot be determined. The chlorination facility is large enough to feed adequate dosages of chlorine under normal high wet weather flows. Mixing is also provided to prevent short circuiting and insure chlorine contact with the wastewater effluent.

Since the plant provides primary treatment only, the unit operations involved are rather simple to control and operate and therefore can be considered reliable. Adequate surveillance is also provided. The West Point treatment plant is manned around the clock. Mechanical, electrical and instrumentation maintenance crews are also available to insure the proper operation of the equipment. Standby power is available for all major equipment and for both the influent and effluent pumping stations, thus maintaining continuous operation of the plant.

Sludge Characteristics and Management

Metro's sludge processing and handling operations are currently centralized at the West Point treatment plant. All sludges generated at Renton, Richmond Beach, and Carkeek Park treatment plants are transferred to the West Point system. The digested sludge from Richmond Beach and Carkeek Park are trucked to the Interbay pumping station and are discharged into the north interceptor which conveys the flow to the West Point treatment plant. The Renton sludge, both raw and waste activated sludge, is transfered undigested to the Elliott Bay interceptor for transfer to West Point.

The West Point sludge captured in the primary sedimentation tanks is digested and dewatered then trucked to Cedar Hills for landfill disposal and to Pack Forest for recycling. The Alki sludge is digested on site and trucked directly to the Cedar Hills landfill site, thus bypassing West Point.

The West Point sludge handling facility consists of 3 100-foot diameter heated anaerobic digesters. Sludge gas is also used to power the plant boilers and to fuel the influent and effluent pump engines. Methane gas in excess of those requirements is flared. The digested sludge is dewatered utilizing a centrifuge and/or vacuum filter in the dewatering building. Sludge conditioning by chemical addition is practiced prior to dewatering.

The sludge handling facility at West Point is not adequate to handle the present sludge load. The digesters volume is not sufficient, resulting in short detention time and poor digestion of the sludge. Adequate dewatering capability is not available either.

In 1975 the average daily digested sludge volumes at West Point fluctuated between 200,000 to 340,000 gal/day with an average of 261,000 gal/day. The tons/day of dry solids ranged between 18 to 55 with an average of 34 tons/day.

As discussed in the Regional EIS, Volume I, potential re-use of sludge is primarily determined by its fertilizer value and by the heavy metals and toxic compounds present in the sludge that may have environmental and health adverse impacts. For further information on the sludge characteristics reference is made to Chapter III of Volume I.

Primary Impacts

Water Quality

Potential impacts of Alternative A would be on Puget Sound water; other alternatives may impact the Ship Canal or Lake Washington. A detailed discussion is given in Chapter III of the Regional Analysis.

Puget Sound. The No Action Alternative would have little or no impact on intertidal, nearshore or offshore temperature, dissolved oxygen, salinity, or BOD. The impacts of nutrients from West Point effluent and continued CSO's on the intertidal near West Point, which is expected to be subject to increased public use, would be substantial because the nutrient load is large; extensive, because the discharge from West Point influences the waters of Puget Sound over a wide area; long-term, because the discharge will continue through the planning period; and reversible. Nutrients offshore from West Point are probably responsible for 15-20 percent increases in extreme values for primary productivity within a mile or so of the outfall. This adverse effect is judged to be minor-to-moderate, limited in extent; and long-term, because the discharge would continue through the planning period. Suspended solids are not expected to have any impact offshore, except in reducing light transmittance to a minor degree over a limited area. Effluent quality would decline in the future as influent begins to exceed solids handling capacity.

Although West Point beaches have edible shellfish and access to them is expected to improve, the taking of specimens from Discovery Park is prohibited. Nevertheless, the microbiological quality of the nearshore waters is of concern. While the water meet swimming standards, the State standard for commercial shellfish is exceeded at all sites monitored. The sources of bacteria have not been identified, but probably include urban runoff, sewer overflows and municipal discharges. The adverse impact is considered to be major, because public health could be jeopardized; not limited to West Point beaches; long-term, because the discharges (treatment plant effluent, CSO's and other sources) would continue through the planning period; and reversible, because improved disinfection could possibly alleviate the problem. Nearshore microbiology effects would be minor, but continuing.

Heavy metals near West Point can be from effluents, sewer overflows, direct runoff, aerial fallout or dredge spoils. The present adverse effect of heavy metals on the intertidal is judged to be minor, because the concentrations are not high; limited to West Point intertidal areas; long-term, because the metals discharges will continue through the planning period; and irreversible, because of the non-degradable nature of the metals. The effect of effluents and CSO's on offshore waters is unknown, but considered to be negligible.

Toxicants and PCB's enter Puget Sound waters through direct industrial discharges, municipal discharges, CSO's and waters from the Duwamish. In addition, PCB's probably enter the West Point area through dumping of Duwamish dredge spoils off Fourmile Rock in Elliott Bay by the U.S. Army Corps of Engineers. Direct industrial discharges include two metal finishing industries discharging to the Sound who are expected to tie in to the Metro system soon (Metro staff, 1976). Present levels of PCB's in effluent CSO's and receiving waters are not well known. The effect on West Point waters is judged to be limited in extent; of long duration, because CSO's and other discharges will continue through the planning period; irreversible because of the non-degradable nature of PCB's; and of undetermined magnitude. The concentration of PCB's in discharges is expected to begin to decline in 1978 with enforcement of the Toxic Substances Act, but would remain an urban contaminant for sometime.

Groundwaters. Groundwater levels are not expected to affect existing structures or processes. The West Point effluent, discharged to Puget Sound, cannot infiltrate groundwater.

Air Quality and Odors

The only air quality impacts would be from odors, which are minor, limited in extent and intermittent, but recurring events. Aerosols and engine emissions are considered to have negligible impacts at West Point.

Geology, Soils and Topography

No impacts are expected as there would be no construction. Earthquake damage potential would continue at present levels, which is considered to be minor, limited in extent and of short duration.

Any effects on shoreline sediment transport due to the existing sludge lagoon on the south beach would continue.

Biology

More is known about the biota near West Point than at any other shoreline site, largely as a result of the opening of Discovery Park adjacent to West Point and the Puget Sound Interim Studies (PSIS). The information is included in detail in the Regional Analysis which is Volume I of this series.

Under Alternative A, West Point effluent quality would decline as loadings increased from growth in sewered areas. At the same time, the volume and frequency of CSO's would increase, continuing and increasing stresses on biota from pathogens, solids, heavy metals, pesticides, oil and grease and other contaminants. A detailed discussion of these effects is given in the Regional Analysis.

Terrestrial habitats. The No Action Alternative is expected to have no impact on terrestrial habitats, such as urban, non-urban, forest and meadow lowland in the service area, as no construction is involved.

The West Point treatment facility is not judged to impact the biota of terrestrial habitats. The impact of the existing facility on the biota of Discovery Park is considered to be negligible.

Shoreline habitats. Marshland habitats are sensitive and exposed to unknown but probably moderate intermittent and recurring stresses, and may accumulate metals, pathogens, and toxicants in biota which could have long term detrimental effects on their behavior, physiology and reproduction. Effects on salmon spawning areas result from siltation of nests or from direct toxicity to the eggs and newly-hatched fish.

There are no freshwater marshes adjacent to the facility, with the exception of the sludge lagoon, which is man-made and not considered in the impact analysis. Freshwater marshes in the West Point service area occur in limited areas along the southwestern shore of Lake Washington, and in the Ship Canal in Union Bay and Portage Bay. All marshes except perhaps that at South Andrews Bay are subject to direct combined sewer overflows (Table 3-6) of various magnitudes.

Table 3-6

Combined Sewer Overflows Emptying Into Marshlands

Overflow	Receiving Water	Volume (mil/gal/yr)
038	Lake Washington	3.1 Westmore Slough
039	Lake Washington	3.1 Westmore Slough
040	Lake Washington	3.1 Lakewood Bay
041	Lake Washington	3.1 Lakewood Bay
042	Lake Washington	3.1 Lakewood Bay
044	Lake Washington	3.1 North Brighton Beach
047	Lake Washington	3.1 Ranier Slough/ Atlantic City Pk
176	Lake Washington	3.1 Ranier Slough/ Atlantic City Pk
171	Lake Washington	3.1 Ranier Slough/ Atlantic City Pk
W041	Duwamish Estuary	2.4 Kellogg Island
018	Union Bay	3.6
021	Union Bay	3.2
139	Portage Bay	Negligible
138	Portage Bay	Negligible
140	Portage Bay	Negligible

Source: McGreevy, 1973; Metropolitan Engineers, 1977

While most individual overflows are relatively small in terms of annual volumes, they are frequent and numerous. In addition, these flows empty into inlets and bays with limited-to-poor mixing and dilution. Based on very limited sampling data (Metro Staff, 1976), overflows contain pesticides, PCB's and metals, in addition to pathogens, solids and BOD. As CSO's are intermittent but continuing events, their effect on sensitive marshland fishes, birds and other life could be moderate-to-major, adverse, and irreversible.

The intertidal. The north and south beaches near the Metro West Point treatment facility are accessible to the public. The PSIS dye studies have indicated that at West Point intertidal and nearshore organisms are occasionally exposed to effluent at a concentration about half that at the diffuser, or 250:1. The frequency and distribution of this event has not been determined. Changes in the intertidal flora at West Point possibly attributable to effluent nutrients have been described in Chapter II of this report. Septic tank seepage in the north side of West Point and south of Perkins Lane at Magnolia Bluff may contribute further pollutants to the intertidal in the form of nitrates and pathogens. No measurable effects have been found on intertidal fauna, except as increased limpet growth at West Point. This effect is judged to be adverse, of minor magnitude, limited in extent to certain beaches, and reversible, but of long duration.

Combined sewer overflows which could affect West Point service area beaches occur at 11 points, including Elliott Bay. Major overflows are 002 at the West Point treatment plant, W027 at Denny Way and W028 and W029 in Elliott Bay. Elliott Bay is included here as longshore water and sediment movement is along the east side of Elliott Bay from the Duwamish to West Point. Elliott Bay receives a total of 358 million gallons annually (Metropolitan Engineers, 1977). Limited sampling of biota at the Denny Way overflow (Metro staff, 1976) indicated a highly disturbed situation reflected in low diversity and abundance of organisms. The Denny overflow itself met water quality criteria for receiving waters (EPA, 1975) for all parameters except mercury; 0.0006 to 0.0016 mg/l versus a criterion of 0.00005 mg/l. Copper and zinc were generally two to three times higher in biota at Denny Way as in sediments. Mercury was not measured at Denny and metals levels in biota at other overflow points were not examined.

As overflows generally contain metals and toxicants which do not degrade and are bioconcentrated, the overflows to Puget Sound may possibly have minor-to-moderate adverse long-term effects, limited to certain intertidal areas and generally long-term and irreversible as metals and toxicants do not degrade.

Levels of trace metals in intertidal biota at outfall and background areas were examined as part of the PSIS (Schell et al., 1977). Mercury in mussels and lead in all organisms examined (a brown alga, a green alga, mussels and clams) were higher at all outfall areas than at background areas (Point No Point, Blake Island). Other trace heavy metals which were higher at Metro outfall areas than at background areas were cobalt in clams, zinc in clams and mussels, copper in clams, chromium, selenium, and cerium in mussels. The U.S. Food and Drug Administration mercury standards for shellfish (0.5 ppm) and the Canadian Food and Drug Directorate lead level of 2 ppm wet weight were not exceeded in any sample. Standards for other metals have not been set.

Intertidal hardshell clams occur on the beach south of West Point. Geoducks occur subtidally at approximately the same location. State standards for fecal coliforms in shellfish waters were exceeded at all sites sampled in the study area. Whether the coliforms are due to surfacing treatment plant effluent, to sewer overflows, to septic tank seepage or a combination of these has not been determined but the latter two sources probably provide the steadiest inputs. Shellfish are not monitored for coliforms in the study area at present and Discovery Park policy prohibits clam-digging on West Point beaches.

Puget Sound. The intertidal, nearshore subtidal, and offshore bottom, free-swimming and planktonic organisms in the study area are subject to effects of combined sewer overflows, treatment plant effluents, runoff, septic tank seepage, boat wastes, dredge spoil dumps, and other pollutant sources. The intertidal zone has been discussed previously.

Phytoplankton productivity is subject to effects of naturally varying chemical and physical parameters. As a result, it is almost impossible to detect the effects of treatment plant effluent nutrients on the variation in algal population size and growth rates in time and space. The only significant longitudinal variation attributed to the West Point outfall is a 15-20% increase in the 1, 2, 3, 5, and 10 year extreme values for productivity at stations within a mile of the outfall. As flows will continue, the effect is judged to be adverse, moderate, reversible, limited in extent and of long duration for phytoplankton. No effect on zooplankton has been determined, perhaps due to sampling problems. In the absence of any data, the effect is judged to be unknown. Metals in plankton near outfall areas have been compared to background areas (Point No Point) (Schell et al., 1977) and to a dredge spoil disposal site off Fourmile Rock in Elliott Bay. Filter-feeding zooplankton take in particles of the size on which metals adsorb best. Zinc and copper were significantly higher in plankton at the West Point outfall areas than at the control station.

The distribution of some nearshore and offshore benthic organisms (foraminifera, worms, clams, snails) appears to be correlated with the typical plume position for West Point effluents, for which data are available, especially along the 150 foot contour. The existing effect is considered to be adverse, moderate, limited in extent, long-term as flows continue, and reversible for nearshore and offshore areas.

Nearshore free-swimming (nektonic) forms include juvenile salmon, herring, and other commercial fishes that frequent the outfall pipe or kelp areas in the daytime or at night. These animals could be occasionally exposed to levels of chlorine and perhaps to other constituents at higher than "safe" levels in effluent.

The change in fish species composition at West Point, discussed in Chapter II of the Regional Analysis (Volume I), may reflect effluent-caused changes in benthic prey species and/or habitat changes due to the outfall pipe itself. Fishes around the West Point outfall may have a higher incidence of disease from crowding or from exposure to pathogens and/or toxicants. The cause of the slightly elevated incidence of tumors in flatfish at West Point has not been identified, however. The overall effect is judged to be adverse and major, but limited in extent, of long duration and probably reversible. While no data are available, it is possible that offshore nektonic organisms may also be occasionally affected by pathogens or toxicants if they swim into or through effluent, or if they feed in nearshore areas at night.

Exposure to chlorine residuals is intermittent, however, and while effluent toxicity has been demonstrated in the laboratory, toxic effects have not been verified in the field.

Commercial and sport fisheries. There are a number of important sport and commercial fisheries within and adjacent to the West Point service area. Those which occur in areas that could potentially be impacted by West Point treatment plant effluent and/or sewer overflows are salmon (spawning and rearing areas in Lake Washington; runs up Ship Canal; sport fishing at Harbor Island, and in Elliott Bay); steelhead (runs up the Ship Canal); and shrimp (fished in Elliott Bay to Harbor Island and in Shilshole Bay at the mouth of the Ship Canal). The Ship Canal is crucial for the migration of juvenile salmonids. The potential for stress on or contamination of these species is quite high. The magnitude of the actual effect is unknown, but could be substantial. The abnormal occurrence of salmon at the south end of Lake Union is an example. The overall effect is considered to be highly probable, adverse, moderate, reversible, extensive and of long duration.

Freshwater environments. Freshwater environments in the West Point service area which may be affected by facilities planning include Lake Washington, Green Lake and Lake Union/ Ship Canal. These are important habitats for a variety of organisms, including sport and commercial fishes.

1. Lake Washington. As described previously, Lake Washington is subject to CSO's, a number of which discharge into salmon spawning areas. Nevertheless, the lake is still in the process of changing from a eutrophic to a meso-eutrophic or better state. Effects of CSO's in lake biota have been examined at one point only (Metro staff, 1976). The effects there were limited but striking - no macroscopic organisms were found anywhere near the outfall. If it is assumed that this is typical, the effect of such CSO's on nearshore areas is judged to be highly probable, adverse, limited to the western shore of the lake, and long term. The impacts of metals, toxicants and nutrients in the overflows are judged to be irreversible as these tend to be recycled in the lake. Effects on offshore lake biota of CSO's are considered to be minor as CSO's tend to move along shore, rather than into open waters.

2. Green Lake. The effect of two minor CSO's on biota of Green Lake is considered to be very minor to negligible, as other inputs dominate water quality.

3. Lake Union/Ship Canal. In general, the biota are those characteristically tolerant of somewhat degraded water quality. The impacts of CSO's on this water are unknown. The Roanoke Street outfall sampled had no visible life anywhere near the outfall or near the effluent plume. Assuming this effect is typical of the 35 overflows (381 mil gal/yr) along the Lake Union/Ship Canal, the effects are potentially major on limited areas near the outfalls. Inputs other than CSO's may predominate, however, so CSO's are judged to have moderate but extensive and long-term effect overall.

Rare or endangered species and sensitive habitats. No listed endangered species are recorded from the study area. Some plants or animals may be rare locally, however. Sensitive habitats include salmon spawning and rearing areas, fish migration routes, lake shallows, and waterfowl resting areas. All but the last have been discussed previously.

Marine birds at West Point are generally winter residents of the region, but the pigeon guillemot breeds at West Point. These birds, which burrow in clay banks or crevices in cliffs, produce only two chicks a year and are considered to be "sensitive" (Salo, 1975). The effects on these and other marine birds at this time are considered to be negligible.

Energy and Natural Resources

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative A, the No Action Alternative, is judged to have a negative impact on "human environment" factors.

Land use. Since in Alternative A, there is no construction, there would be no change in land use at the existing treatment plant sites. Building permits would be unnecessary, and no permit would be required under the Shoreline Management Act.

The presence of the West Point wastewater facility conflicts in part with the natural setting of the park.

Agency goals. Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance, and CSO control.

It is debated whether the position of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would provide an open space of quiet and tranquility for the citizens of Seattle, and whether the facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out, parenthetically, that the West Point facility was constructed long before the Discovery Park land was acquired from the Fort Lawton Military Reservation.

Employment and costs. Employment and cost impacts are not analyzed on a site-specific basis. Rather, these are analyzed in the Regional Environmental Impact Statement. Resources and energy consumption occurs on an interrelated basis at the five existing Metro plants and potential new sites.

Social, recreational and cultural. Under Alternative A, the West Point facility would remain in its present location, keeping restrictions on the recreational use of the West Point area. Because of the location of a fence, the beach north of the facility cannot be used at high tide; the sludge basin discourages use of the beach to the south of the facility. However, site location at West Point keeps the Interbay sites free from development.

This alternative does not comply with the wish of 60% of the 377 Magnolia area people polled that secondary treatment be implemented. This impact is considered adverse, major, long-term, reversible and probable.

Archeological and historical. Since Alternative A includes no construction, there would be no new impacts on archeological and historical sites.

Health and safety. There may be health risks assocciated with the consumption of shellfish due to the continued discharge of primarily treated waste, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport, or handled on site. Although nearly every U. S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as improbable as for any other trucks in transit.

Since there would be no construction, there would be no risk to health or safety in this category.

Aesthetics and nuisance. The West Point wastewater treatment facility is well designed for consideration of aesthetics. It lies low, is clean, and is surrounded by well-kept grass. Few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs. Only 10% of 377 randomly selected citizens of adjacent areas interviewed by Gerhardt Research were opposed to the location of the West Point facility. The placement of the facility would continue under Alternative A. Although any wastewater treatment plant is a nuisance, the impact at West Point has been minimized. These impacts would be adverse, minor, long-term, local, reversible only at great cost, and definitely would occur if Alternative A is implemented in its present form.

The noise and traffic of sludge trucking is a minor nuisance which did not seem to bother many people. Some people did not even know which route the trucks traveled (HRPI, 1976). This is expected to continue as present.

CSO's will be dealt with in the Regional EIS, and in the water quality section of this document.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative does not meet the requirements of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Because of the no action definition of Alternative A, no mitigation measures can be proposed.

Unavoidable Adverse Effects

All adverse impacts under Alternative A would be unavoidable. These would include impacts on water quality from CSO discharge, related impacts on fish and public health, continued use of plant sites in parks or residential areas, and noncompliance with PL 92-500.

ALTERNATIVE B-METRO COMPREHENSIVE PLAN (NO ACTION PURSUANT TO PL 92-500)

Alternative B continues system upgrading in accordance with the Metro Comprehensive Plan with maintenance of primary treatment at West Point. Alternative B can be viewed as no action with respect to Public Law 92-500 and maintains service to existing residents and additional customers as required.

Service Area

The existing West Point service area would be modified as shown in Figure 3-1 by transferring the North Lake Sammamish service area to Renton by the Redmond connection, and transferring Val Vue from Renton. To serve increased flows from the North Lake Washington areas would require construction of a parallel Kenmore interceptor (or other transfer facility).

Treatment Plant

The West Point plant would provide primary treatment for 142 mgd dry weather and 350 mgd wet weather flows. The plant has adequate primary capacity to serve 2005 non-storm flows for the projected change in service area population. Primary treatment and discharge to Puget Sound would continue. Effluent quality would be 115 mg/l BOD and 110 mg/l SS. Plant layout would be as shown in Figure 3-3 . New sludge digesters would be added to handle additional loads from Renton and the additional sewered population in the North Lake Washington area.

Combined Sewer Overflows

The current program of maximizing existing inline storage capacity for control of combined sewer overflows would be continued with construction of a regulator station at Third Avenue West. However, overflows of combined sewage would increase in the Lake Union-Ship Canal area due to increased flows from the northern West Point service area.

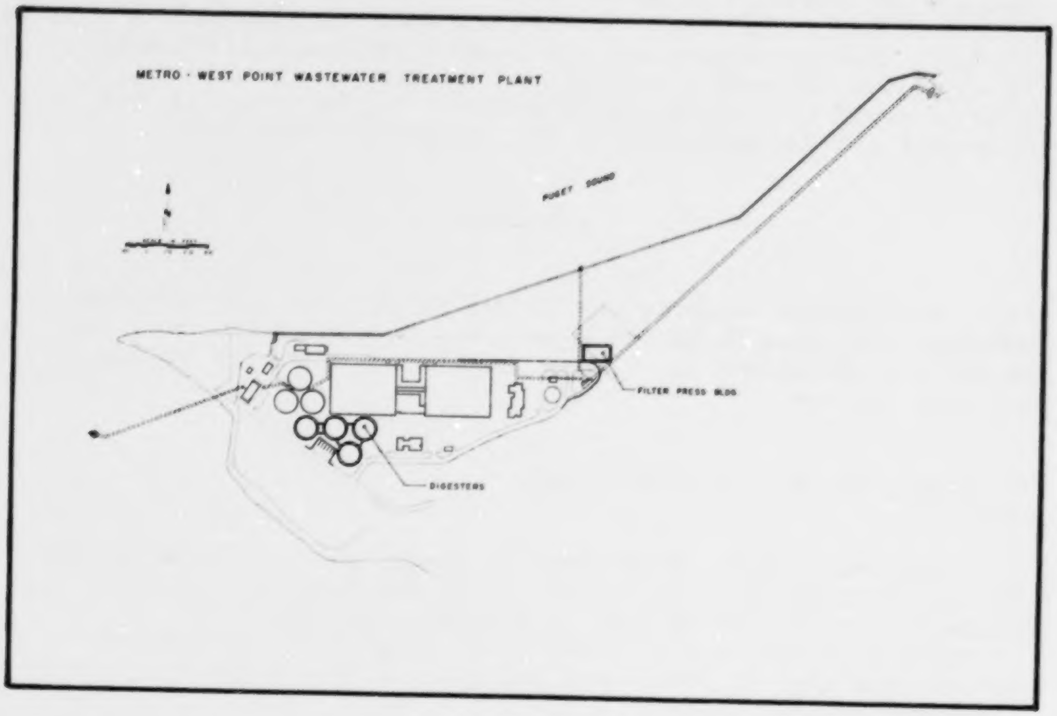

METRO - WEST POINT WASTEWATER TREATMENT PLANT
N
PUGET SOUND
FILTER PRESS BLDG
DIGESTERS

Figure 3-3
West Point Layout — — Alternative B

Sludge

West Point would remain the major solids processing center for Metro. It would treat digested sludge from Richmond Beach and Carkeek Park as well as sludge from Renton. Sludge digestion and dewatering capacity would be expanded to handle additional loadings. Dewatered sludge would be trucked to the Cedar Hills landfill for disposal and to Pack Forest for recycling research.

Impacts

The direct impacts projected under this alternative through the year 2005 are described below. Secondary impacts are discussed in the Regional EIS which is Volume I of this series.

Geology, Soils and Topography

Alternative B would require excavation of some of the filled area of West Point to allow construction of the foundations for three new digesters. As the site is covered by fill, which tends to be unstable, piling and dewatering may be necessary for structural support. Potential earthquake damage to low structures on fill would be minor, extensive and short-term. Erosion would also be a minor, short-term problem of limited extent, as would changes in topography and soil profile. Shoreline fill would not be involved. Any effects on shoreline sediment transport due to the sludge lagoon would continue. Not enough information is available at this time to evaluate the impact, however.

The construction of the Kenmore parallel interceptor would temporarily alter lake bottom and shoreline soil profiles and topography and increase nearshore erosion and deposition.

Air Quality and Odors

The additional digesters would increase the potential for odors at West Point. The effect is expected to be very minor, limited in extent and intermittent but recurring, as the site is well-ventilated. Particulates would increase for a short period during construction, and could affect a limited area to a minor extent. If dechlorination facilities are provided at West Point, substantial amounts of toxic sulfur dioxide gas will be required. Handling procedures required would be similar to those for chlorine. During construction of the Kenmore parallel interceptor particulates and engine emissions would locally increase for a short time.

Water Quality

Alternative B would affect Puget Sound and Lake Washington.

Puget Sound. Alternative B would be expected to hve no impact on intertidal, nearshore or offshore temperature, dissolved oxygen, salinity, or BOD. The adverse impact of nutrients from the West Pont effluent and continued CSO's on the intertidal near West Pont, which is expected to be subject to increased public use, could be moderate, because the discharge is sizeable; long-term, because the discharge will continue through the planning period; and reversible. Nutrients offshore from West Point are probably responsible for increases in extreme values for primary productivity within a mile or so of the outfall. This adverse effect is judged to be moderate, limited to water near West Point; long-term, because the discharge would continue through the planning period; and reversible. Suspended solids may be reaching West Point beaches from effluent and from overflows. This adverse impact is considered minor, because the suspended solids load of receiving waters is not greatly increased; long-term, because the discharge would continue through the planning period; and reversible. Suspended solids are not considered to have any impact offshore, except in reducing light transmittance to a minor, limited extent for a short time. Eflluent quality would decline in the future as influent begins to exceed solids handling capacity.

Although West Point beaches have edible shellfish and access to them is expected to improve, the taking of specimens from Discovery Park is prohibited. Nevertheless, the microbiological quality of the nearshore waters is of concern. While the waters meet swimming standards, the State standard for commercial shellfish is exceeded at all sites monitored. This adverse impact is considered to be major, because public health could be jeopardized; not limited to West Point beaches; long-term , because the discharge would continue through the planning period; and reversible, because improved disinfection could probably alleviate the problem. Nearshore microbiology effects would be minor, limited but continuing.

Heavy metals near West Point can be from effluents, sewer overflows, direct runoff, aerial fallout or dredge spoils. The present adverse effect of heavy metals on the intertidal is judged to be minor, because the concentrations are not high; limited to West Point intertidal areas; long-term, because the metals sources will continue through the planning period; and irreversible, because of the nondegradable nature of the metals.

The effect of effluents and CSO's on offshore waters is unknown, but considered to be negligible. Toxicants and PCB's enter Puget Sound waters through direct industrial discharges, municipal discharges, CSO's and waters from the Duwamish. In addition, PCB's probably enter the West Point area through dumping of Duwamish dredge spoils off Fourmile Rock in Elliott Bay by the U.S. Army Corps of Engineers. Direct industrial discharges include two small metal finishing industries discharging to the Sound who are expected to tie into the Metro system soon (Metro Staff, 1977). Present levels of PCB's are not well known. The effect on West Point waters is judged to be limited in extent; of long duration, because CSO's and other discharges will continue through the planning period; irreversible because of the non-degradable nature of PCB's, and of undetermined magnitude. The concentration of PCB's in discharges is expected to decline in 1978 with enforcement of the Toxic Substances Act.

Lake Washington. The construction of the Kenmore parallel in the West Point service area, along the northwestern shore of Lake Washington, would affect the lake's water quality through increased turbidity and perhaps resuspension of metals and other materials associated with lake sedement. Te effect is described in more detail in the Regional Analysis. The probable adverse effect on water quality is considered to be moderate, but highly limited in extent in the lake, of short duration and reversible as particles resettle.

Groundwaters. Groundwater levels are not expected to affect existing structures or processes. The West Point effluent, discharged to Puget Sound, cannot infiltrate groundwater.

Biology

Alternative B continues primary effluent discharge to Puget Sound and adds digesters at the West Point site. Impacts in adjacent Puget Sound shores and waters from CSO and effluents increase moderately over levels in Alternative A. CSO to freshwaters would also increase moderately, and Lake Washington would be further disturbed by construction of the Kenmore parallel interceptor.

Terrestrial habitats. Some minor, limited short-term impacts due to digester construction could occur on terrestrial animals. The removal of some non-urban terrestrial habitat would have a minor, limited, but long-term adverse effect. The impact of construction noise on this and on forest habitat at Discovery Park would be negative, minor, limited in extent, short-term, and reversible as the animals would return to the area once construction is complete.

While the exact route of the Kenmore parallel interceptor is undecided, it is certain that some temporary minor disturbance of terrestrial habitats would occur due to noise and physical disturbance due to construction activities. The impact is expected to be minor, but extending 4000 feet along the northwestern shore of Lake Washington. The effects would be short-term (for the duration of construction plus a short time afterwards) and reversible as the plants and animals could recolonize the area once construction is completed.

Shoreline habitat. The effects of Alternative B on shoreline habitats would result from increased overflows to Lake Washington and the Lake Union/Ship Canal, and from the construction of the Kenmore Parallel interceptor. This pipe could be laid along the northwest shore of Lake Washington and underwater to Matthews Park should the lake line be the chosen route.

The interceptor construction would cause turbidity, accelerated erosion and siltation in nearshore waters and alteration of benthic sediments, very possibly near salmon spawning areas. Benthic organisms and salmon eggs could be buried, and aquatic plants affected by decreased light levels due to turbidity. The effect could be major, but would be limited in extent to nearshore areas along a part of Lake Washington, and would be short -term and reversible as the biota (other than salmon) readjust to new environment. Salmon would probably not return to silted areas to spawn as the fish require clean, well-aerated gravels.

Sewer overflows and their BOD and solids loads would increase about 36% under Alternative B over present (A) levels. It is assumed that loadings of oil, grease, metals and toxicants would probably increase similarly. PCB's would begin to decline after 1978, unless reservoirs of these toxicants remain in the interceptors to be partially flushed with each storm.

The increase in CSO's is judged to be moderate. The poorly known effects of CSO's on freshwater biota (Metro Staff 1976) are severe, but limited in extent. The projected 36% increase could probably increase the extent and severity of the effect by a similar amount as more organisms would be affected by the solids, BOD, metals, pesticides, toxicants, oil and grease.

The intertidal. Alternative B would impact the West Point intertidal through a 30% increase in flows and loads by 2005 from West Point. Overflows to the Elliott Bay/West Point area would continue at levels in Alternative A

Surface tidal current patterns in Central Sound indicate eddy systems forming north and south of West Point. Dye studies at West Point indicate that intertidal and nearshore organisms are occasionally exposed to effluent at a concentration of about half that at the diffuser or 250:1. Effects found to date on intertidal organisms which could be attributed to effluent are primarily on the floral assemblage--algae and diatoms at West Point. Limpets, among the main consumers of these plants, show increased growth rates. The expected 30% increase in flows from West Point, could have a concomitantly larger effect, especially if industrial growth keeps pace with population growth.

Major CSO's which occur to Elliott Bay and West Point area beaches would continue at present levels. The effects observed to date indicate severe adverse effects, which appear to be limited in extent. Insofar as CSO's contain non-degradable materials, (metals, toxicants) their effects are irreversible. The effects of effluents, by contrast, appear to be minor-to-moderate, adverse, and affect portions of the shoreline of unknown magnitude. The parameters which appear to be most involved are nutrients. It is recognized that a number of other parameters in effluents which may also be having effects have not been measured. As metals are generally higher in intertidal biota near outfall areas at this time, and flows and loads are expected to increase in the future, metals could increase to levels approaching U.S. and Canadian standards for mercury and lead. While coliform bacteria have not been measured in intertidal shellfish, the overlying waters fail to meet State bacterial standards. As edible shellfish are found near outfall sites the potential effects on public health of metals and pathogens are a consideration. Clam digging is prohibited on the south beach, but mussels are occasionally taken from the north beach.

In summary, it is not known which affects the intertidal community more overall - CSO's or effluents. Effluent quality is generally fairly well known (except for toxicants and trace elements), but its frequency of contact with the intertidal is not. CSO quality, on the other hand, is poorly known, but frequency of occurrence has been evaluated.

Puget Sound. The intertidal, nearshore subtidal, and offshore bottom, free-swimming and planktonic organisms in the study area would continue to be subject to effects of combined sewer overflows at present levels, increased flows and loads from treatment plant effluent, plus runoff, septic tank seepage, boat wastes, dredge spoil dumps, and other pollutant sources. The intertidal zone has been discussed previously. The difference in effects between Alternatives A and B are due primarily to increases in effluent flows. The 1, 2, 3, 5 and 10 year phytoplankton productivity extremes appear to be 15 - 20% higher within a mile of West Point. A 30% future increase in nutrients from that outfall could be reflected in a similar increase in the percentage and the area affected. No effect on zooplankton has been determined, perhaps due to sampling problems. In the absence of any data, the present effect is judged to be unknown and future effects unpredictable. Metals would probably remain higher in zooplankton near outfall areas than at background areas, however (Schell et al.,1977).

The effects on the benthcs identified in PSIS to be correlated with the West Point plume position would continue and perhaps increase. The adverse effect would continue to be moderate-to-major but probably somewhat more extensive with increased flows.

Nearshore free-swimming (nektonic) forms include juvenile salmon, herring, and other commercial fish that frequent the outfall pipe or kelp areas, in daytime or at night. These animals could continue to be intermittently exposed to levels of chlorine at higher than "safe" levels and perhaps to other constituents in effluent.

The change in fish species composition at West Point, discussed in Chapter II, may reflect effluent-caused changes in benthic prey species and/or habitat changes due to the outfall pipe itself. The cause of the slightly elevated incidence of tumors observed in flatfish at West Point has not been identified. The overall effect is judged to be adverse, major, but limited in extent, of long duration and probably reversible.

While no data are available, it is possible that offshore free-swimming organisms may also be occasionally affected by chlorine, pathogens or toxicants if they swim into or through effluent, or if they feed in nearshore areas at night.

Criteria for intermittent exposure of aquatic organisms to total residual chlorine (TRC) are time-related. For marine organisms, a concentration of 0.02 mg/l for 100 minutes is a recommended threshold (Brungs, 1976; Mattice & Zittel, 1976).

Chlorine residuals were measured in effluent as part of toxicants studies upstream of the outfall in the same manner as normal monitoring at West Point. As the outfall is used for chlorine contact, the laboratory data did not necessarily reflect the actual residual at the diffuser. Nevertheless, the measured residuals indicated that peaks of 2 mg/l or higher were not uncommon. The diffuser is assumed to give a 100:1 dilution, such that levels of 0.02 mg/l and greater are possible in the mixing zone in the receiving waters. It seems possible, therefore, that free-swimming organisms congregating at the outfall could be exposed to higher than "safe" levels of chlorine during slack water periods. No toxic effects have been verified in the field, however.

The potential effect on these organisms is considered to be adverse, minor, limited in extent, of short duration and reversible, even with increased effluent flows and no improvement in chlorination practices.

Commercial and sport fisheries. There are a number of important sport and commercial fisheries within and adjacent to the West Point service area. Those which occur in areas which could potentially be impacted by treatment plant effluent and/or sewer overflows are salmon (spawning and rearing areas in Lake Washington; runs up the Ship Canal; sport fishing in Elliott Bay;) steelhead (runs up the Ship Canal); and shrimp (fished in Elliott Bay to Harbor Island and in Shilshole Bay at the mouth of the Ship Canal). The Ship Canal is crucial for the migration of juvenile salmonids. The potential for stress or contamination of these species is high. The magnitude of the actual effect is unknown, but could be substantial. The abnormal occurrence of salmon at the south end of Lake Union is an example (Metro, 1976). Under Alternative B, overflows to Union Bay and the Ship Canal would increase by about 22%. The adverse impact could become a major one, as this waterway is an important salmon and steelhead run. The above effects could be extensive in these waters; long-term, as several generations of fishes could potentially be affected; and reversible. As discussed below, chinook salmon spawning areas could possibly be silted over during construction of the Kenmore parallel interceptor.

Freshwater environments. These are important habitats for a variety of organisms, including sport and commercial fishes.

1. Lake Washington. As described previously, Lake Washington CSO's, a number of which discharge into salmon spawning areas, would increase 36%. Effects of CSO's on lake biota have been examined at one point only (Metro Staff 1976). The effects observed were limited but striking--no macroscopic life was found anywhere near the outfall. With increased overflows, the effects, already major in unlimited areas along the western shore, would become more extensive, and would continue to be long-term and irreversible due to metals and toxicants. Effects on offshore biota would probably continue to be minor, as CSO tend to move along shore rather than into open waters.

The construction of the Kenmore parallel could cause major, but limited and short-term (perhaps 15 months) increases in turbidity and generally disrupt 4000 feet of the shoreline and nearshore waters and biota of northwest Lake Washington. Salmon spawning areas, which require clean gravel, could possibly be silted over. Construction noise would probably temporarily frighten off fish and wildlife. The adverse effect is judged to be major but limited, short-term and reversible. Offshore areas would receive lesser effects. Mitigation measures are discussed in a subsequent section of this chapter and further environmental analyses of possible impacts would be conducted prior to construction.

2. Green Lake. The effect of very small increases in two minor CSO's on biota of Green Lake is considered to be negligible as other inputs dominate water quality.

3. Lake Union/Ship Canal. Sewer overflows to this water could increase about 22%, placing further stress on an already stressed biota. The impacts of CSO's on overall

water quality are unknown, however. The data available on one overflow suggest that at limited areas near the outfalls the effects are severe; no visible life anywhere near the outfall or the effluent plume. Assuming this effect is typical of all overflows along the Canal, the effects of increased flows would be major, limited in extent, though less so than at present, long-term as CSO's could continue and irreversible if they contain toxicants and metals as seems likely.

Rare or endangered species and sensitive habitats. No listed endangered species are recorded from the study area. Sensitive habitats, which include salmon spawning and rearing areas, fish migration routes, and lake shallows have been discussed in previous sections. Waterfowl rest throughout the service area, generally in winter. The "sensitive" pigeon guillemot, however, nests in clifs at West Point but would not be affected by Alternative B.

Energy and Natural Resources

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative B, Metro Comprehensive Plan (No Action Pursuant to PL 92-500), has a negative impact on some human environment factors and some positive impacts.

Land use. The only new construction which occurs under Alternative B is of four new sludge digesters to the northeast of the existing facility, as indicated in Figure 3-4. This would not greatly increase the amount of land used, and occurs in an area which has little impact. This is considered adverse, minor, long-term, local, reversible only with financial outlay, and would definitely occur if Alternative B is implemented in its present form.

Agency goals. Many of the impacts related to agency goals have been developed in the REgional EIS, including those goals related to PL 92-500 compliance and CSO control.

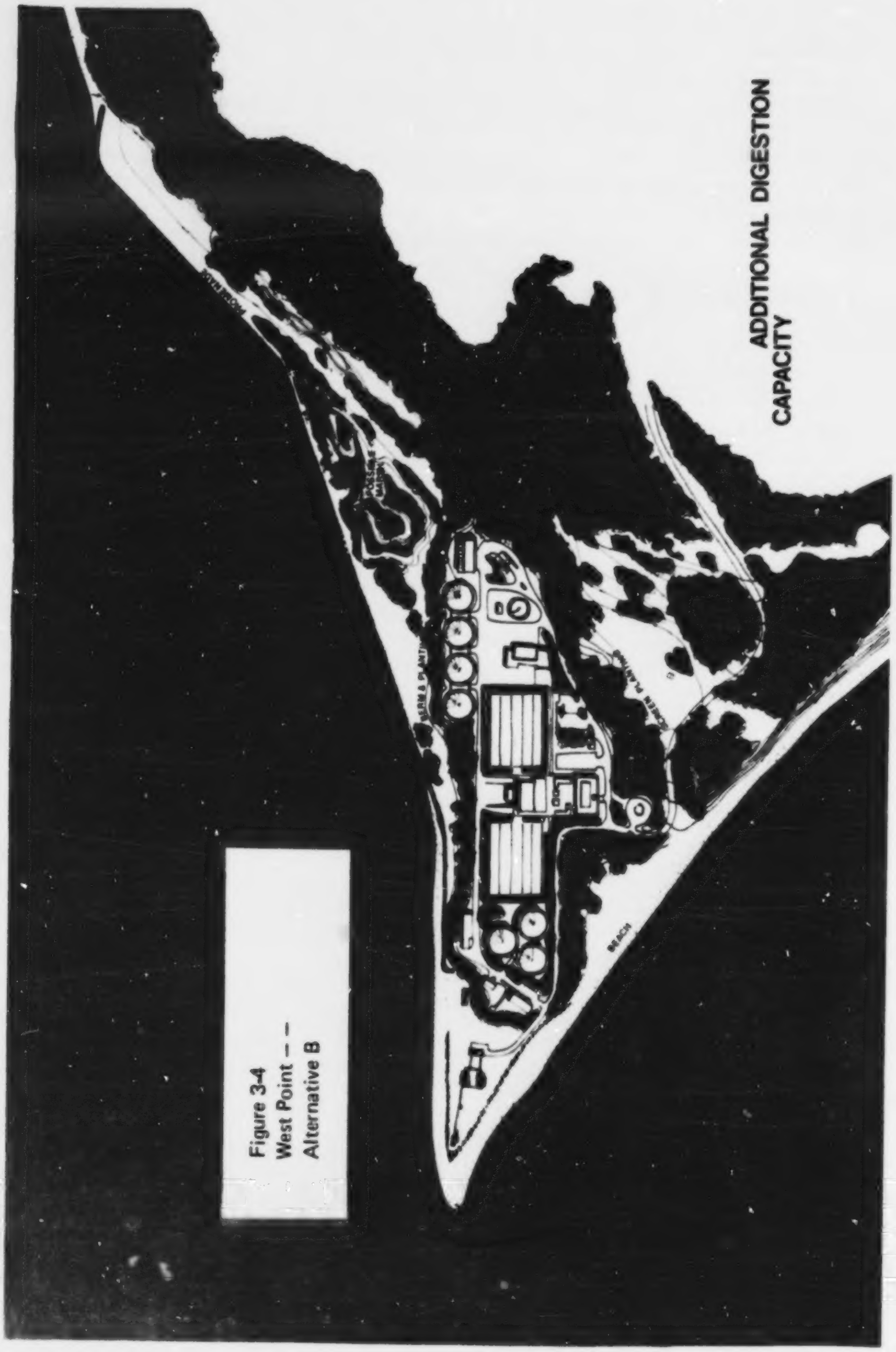

ADDITIONAL DIGESTION CAPACITY
BERM & PLANTING
SCREEN PLANTING
BEACH

Figure 3-4
West Point — —
Alternative B

It is debated whether the position of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would provide an open space of quiet and tranquility for the citizen's of Seattle; and whether the facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out parenthetically, that the West Point facility was constructed long before the Discovery Park land was acquired from the Fort Lawton Military Reservation.

Employment and costs. Employment and cost impacts are not analyzed on a site-specific basis. Rather, these are analyzed in the Regional Environmental Impact Statement. Resources and energy consumption occurs on an interrelated basis at the five existing Metro plants and potential new sites.

Social, recreational and cultural. Under Alternative B, the West Point facility would expand in its present location, keeping restrictions on the recreational use of the West Point area. Because of the location of a fence, the beach north of the facility cannot be used at high tide, although there is access to the area. The sludge basin which discourages use of the beach to the south of the facility would not be removed. However, site location at West Point keeps the Interbay sites free from development.

This alternative does not comply with the wish of 60% of the 377 Magnolia area people polled that secondary treatment be implemented. This impact is considered adverse, major, long-term, reversible, and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by former construction. No historical sites are in the affected areas.

Health and safety. There may be health risks associated with the consumption of shellfish due to the continued discharge of primarily treated waste, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport, or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as improbable as for any other trucks in transit.

Construction and safety risk would be as for any other similar construction; with safety-conscious procedures there should be a slight chance of accidents.

Aesthetics and nuisance. The West Point wastewater treatment facility is well designed for consideration of aesthetics. It lies low, is clean, and is surrounded by well-kept grass. Few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs. Only 10% of those interviewed by Gerhardt Research were opposed to the location of the West Point facility. The additional sludge digesters have been placed such that they are not visible behind the bluff at Discovery Park. These impacts would be adverse, minor, long-term, local, reversible only at great cost, and definitely would occur if Alternative B is implemented in its present form.

The noise and traffic of sludge trucking is a minor nuisance which did not seem to bother many people. Some were unaware of the route the trucks traveled (HRPI, 1976). This is expected to continue as present.

CSO's will be dealt with in the Regional EIS, and in the water quality section of this EIS.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative does not meet the requirements of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

While chlorine feed is residual paced at West Point, the residual is measured a short distance downstream of the chlorine feeding point and therefore does not reflect the actual chlorine residual before discharging into Puget Sound. Therefore the exact chlorine dosage required to provide adequate disinfection and the extent of disinfection in terms of the number of bacteria remaining or residual chlorine cannot be determined. Installing a chlorine contact tank would maximize the effectiveness of chlorination treatment.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, this facility would occasionally receive "slugs" of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

The following measures could be taken to improve the aesthetics and recreational usage of the West Point site:

The sludge lagoon could be removed and the beach restored. This action would also eliminate any effects of the structure on longshore sediment transport. The existing access road south of the sedimentation tanks could be rerouted and the existing parking lot removed to increase usable public space at the south beach. A large landscaped earth-sludge berm approximately 20 feet high could be located between public activities and the plant. Increased planting along the entrance road would enhance visual screening. The berms can be developed as visual extensions of the bluff. The remainder of the plant could be also surrounded by landscaped earth-sludge berms; new digesters to the north could be partially depressed and "buried" by berms. These are shown in Figure 3-4.

Possible sludge truck traffic could be isolated along the southeastern property line between the plant and bluff to minimize visual and noise intrusion. The northern portion of the Metro property could be developed in a manner compatible with park objectives. Both a saltwater marsh fed by a new channel through the existing seawall, and a freshwater marsh fed by existing streams from the bluff are illustrated as possibilities; a range of other possibilities and configurations is conceivable.

Public access along the entire shoreline could be maintained and enhanced. These landscaping measures are developed in more detail in the Facility Plan, Part 2.

The possible silting over of salmon spawning grounds during the construction of the Kenmore parallel (Lake Line Option) called for under this alternative could cause impacts, both environmental and economical. Therefore it is recommended that an evaluation study be made on the Force Main Option to determine its possible impacts. Not enough information is presently available to consider this option.

If the Lake Line is selected, the use of washed beach gravel as backfill in the construction of the Kenmore parallel could encourage salmon spawning, as in the construction of the North Mercer Island interceptor in 1970. Such a measure would require the cooperation of both federal and state agencies to be successful. Timing construction to avoid salmon spawning or intra-gravel development periods would limit construction to the months of March to September, probably increasing construction costs. Further environmental analyses would be conducted prior to construction.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Combined sewer overflows. This alternative does not take adequate measures to control CSO's; they will still occur in wet weather.

Primary effluent effect on water quality. This alternative does not implement secondary treatment; the water degradation of Puget Sound would continue.

Non-compliance with PL 92-500. Public Law 92-500 requires the installation of secondary treatment. This alternative does not comply.

Land use. Land is required in all alternatives; the question is: where will the impact occur?

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest?

O & M and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

ALTERNATIVE C
MAJOR COMBINED SEWER OVERFLOW CONTROL

Alternative C is aimed at providing control of combined sewer overflows. West Point would become an enhanced primary treatment plant under this alternative.

Service Area

The West Point service area would be reduced by annexing the eastern half of the North Lake Washington and North Lake Sammamish service areas to Renton via North Creek-Hollywood connection and sending Val Vue to Renton, as shown. The west North Lake Washington area can be served by the existing Kenmore interceptor by provision of an off-line storage facility for intermittent peak storm-influenced flows. Provision of additional wet weather capacity in southern West Point area accommodates abandonment of the Alki plant. During non-storm flows Alki sewage is treated at West Point and during storm flow at the Duwamish plant.

Combined Sewer Overflow Control

Overflows in the West Point service area to Lake Washington would be controlled to one overflow event every 10 years, Lake Union-Ship Canal to one overflow event per year, and overflows in the Duwamish and Elliott Bay to 10 overflows per year. This is achieved by construction of both city and Metro storage and transport capacity, and Metro treatment capacity by construction of a 250 mgd wet weather plant in the lower Duwamish. Projected annual pollutant load reduction by receiving waterbody is shown in Table 3-7. A new outfall would be built at Interbay discharging up to 161 mgd of combined sewer overflows to Elliott Bay. Three Metro (Magnolia, Dexter, and Belvoir), and eight City of Seattle holding tanks would be built in the West Point service area, plus the Ballard parellel trunk and the North interceptor parallel.

Treatment Plant

West Point would be upgraded to provide enhanced primary treatment by chemical addition to improve settling in 1985. Chemicals would only be added in the summer, improving BOD

Table 3-7

Annual CSO Pollutant Load -- Alternative C

Water Body Location	Baseline Alternative B			Alternative C		
	Volume (mil gal)	BOD (ton)	Solids (ton)	Volume (mil gal)	BOD (ton)	Solids (ton)
* Green Lake	--	--	--	--	--	--
* Lake Washington	22.4	5.58	20.4	0.19	0.05	0.17
* Montlake Cut * Portage Bay	228	59.3	241	35.8	8.91	32.4
* Lake Union	56.6	14.1	51.4	4.14	1.03	3.76
* Fremont Ship Canal * Salmon Bay	254	63.3	231	28.0	7.0	25.4
* Elliott Bay	358	89	325	448	112	406
Duwamish River	251	62	227	186	46.5	168
Puget Sound (Alki)	5.46	1.36	4.95	0.15	0.04	0.14
Σ	1175.46	294.64	1100.75	702.3	175.5	635.9
Approximate Overall Percent Reduction		0		40	40	42
* In West Point Service Area		0		44	44	46

Source: Metropolitan Engineers, 1977.

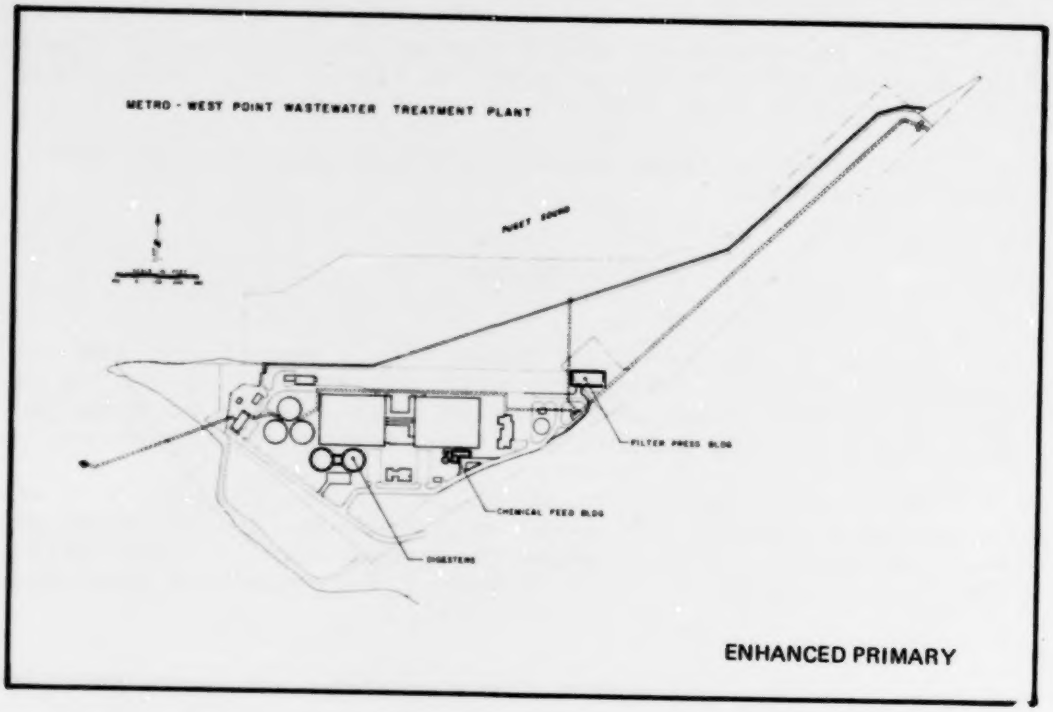

METRO - WEST POINT WASTEWATER TREATMENT PLANT
PUGET SOUND
FILTER PRESS BLDG
CHEMICAL FEED BLDG
DIGESTERS
ENHANCED PRIMARY

Figure 3-5
West Point Layout — — Alternative C

and solids loads to 75 and 30 mg/l respectively. At other times of the year, primary treatment would be used and produce effluent with 115 mg/l BOD and 110 mg/l solids.

Chemical treatment would require adding chemical storage and feeding facilities, as shown in Figure 3-5. Otherwise, the plant would look much the same as it does now.

Discharge to Puget Sound would continue through the existing outfall.

Sludge

Renton sludge would be removed from West Point and treated at Renton. Richmond Beach digested sludge would be trucked to West Point and Duwamish sludge would be sent to West Point via the Elliott Bay interceptor after each storm.

New sludge digesters, shown in Figures 3-5 and 3-6, would be needed to handle the added solids loads from enhanced primary treatment. Sludge would be hauled away to Cedar Hills for landfill disposal and to Pack Forest for recycling research.

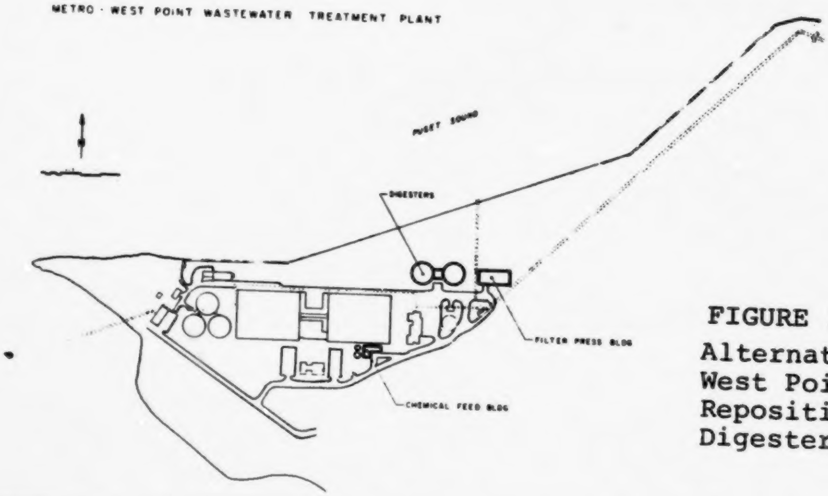


FIGURE 3-6
Alternative C --
West Point
Repositioned
Digesters

Impacts

The direct impacts projected under this alternative through the year 2005 are described below. Secondary impacts are discussed in the Regional EIS which is Volume I of this series.

Geology, Soils and Topography

Under Alternative C, two digesters would be built at West Point. Excavation would be required of some of the filled area of West Point to allow construction of the foundations for these new digesters. As the site is covered by fill, which tends to be unstable, piling and dewatering may be necessary for structural support. Potential earthquake damage to low structures on fill would be minor, extensive and short-term. Erosion would also be a minor, short-term problem of limited extent, as would changes in topography and soil profile. Shoreline fill would not be involved.

The impacts of holding tank construction are discussed in the Regional EIS.

Any impacts in longshore sediment transport due to the configuration of the sludge lagoon would continue. Present information is insufficient to evaluate effects at this time.

Air Quality and Odors

Upgrading the West Point plant to enhanced primary treatment would slightly increase the potential for odors escaping. Odor problems at West Point would continue to be minor, limited in extent, and intermittent. Control of CSO's would reduce the frequency of CSO-derived odors. The benefits of CSO control and the impacts of holding tank construction are discussed more fully in the Regional EIS.

Water Quality

Alternative C includes enhanced primary treatment of West Point effluent, achieving a 20% decrease in BOD and solids, but a 25% increase in CSO flows and loads to Elliott Bay through a new outfall from Interbay. CSO's to Lake Washington would be reduced 99%, to the Ship Canal/Lake Union by about 84% (93% to Lake Union alone) as shown in Table 3-7 by transfer to Interbay.

Puget Sound. Nutrient loads would increase slightly due to the new CSO at Interbay of about 90 million gallons annually. Effluent nutrient impacts would remain at Alternative B levels as phosphate is never limiting in the Sound and nitrogen would not be effectively removed by the chemical precipitation process. Suspended solids would decrease overall, as the load removed from West Point effluent is 35 times larger than the increase due to the new CSO outfall at Interbay.

Alum precipitation would assist removal of pathogens and other microorganisms, but the burden of disinfection will remain with chlorine, which could be more effective if solids are reduced and disinfection practices are improved. Some improvement in microbiological quality could result from enhanced primary treatment. At the same time, a large new CSO outfall discharging about 90 million gallons per year at a depth of 50 feet some 1200 feet from shore would probably degrade microbiological water quality as the effluent surfaced along the north shore of Elliott Bay. In winter, winds tend to hold surface waters against the shore, and mixing is slow. Longshore current driven by wet weather Duwamish outflow and by tides could carry the flow westward toward West Point. Microbiological quality of these waters would receive intermittent negative impacts of unknown but probably substantial magnitudes, of long duration as overflows would continue from year-to-year and reversible.

The overflow would also add a new metals, toxicants, oil and grease source to Elliott Bay and possibly to the area south of West Point. Heavy metals loads would decrease from West Point due to improved treatment, but other metal sources would not be affected. Offshore, metals removals are not likely to affect water quality, but could affect sediments and their reservoir of metals near outfalls. Toxicants attached to particulates would also be affected by chemical treatment. PCB's, which are probably from overflows, Duwamish outflow and dredge spoils, would probably not be reduced, except indirectly as a result of enforcement of the Toxic Substances Act.

Lake Washington. CSO's to Lake Washington would be reduced 99%, resulting in a moderate improvement in the quality of nearshore waters of the lake. Loads of nutrients, solids, BOD, pathogens, oil and grease, metals and toxicants would be greatly reduced. Occasional health risks from coliform levels exceeding state bathing standards would probably be similarly reduced. Loads to the lake are small relative to CSO's to other water bodies (Table 3- 7), but Lake Washington is considered to be sensitive , and CSO's are frequent.

Lake Union/Ship Canal. CSO's would be reduced by about 84% to this system, with 93% reduction in flows to Lake Union alone. As the overflows to these waters are presently 24 times larger than to Lake Washington, and the latter is orders of magnitude larger than the Ship Canal/Lake Union system, this is considered to be a moderate-to-major benefit, extensive in this water system, of long duration and reversible in reducing BOD solids, nutrients, turbidity, oil and grease, metals, toxicants and pathogens loads.

Green Lake. Even with some CSO control the benefit to this small lake would be negligible, as other inputs determine water quality.

Groundwater. Groundwater levels could have a minor, limited but long-term adverse impact if dewatering is necessary at the construction site.

Biology

Alternative C calls for discharge of primary effluent treated with alum to precipitate solids. Effluent discharged to Elliott Bay from a new overflow outfall could move along shore to West Point. Its impact on West Point areas is judged to be unknown at present. Two digesters would be built at West Point. Major CSO control would relieve pressures on biota in Lake Washington, Lake Union/Ship Canal and near West Point. Effluent flows at West Point would be essentially the same as in Alternative B, but BOD and solids would be reduced 20% below baseline levels.

Terrestrial habitats. The effect on terrestrial habitats at West Point is assumed to be minor, limited in extent but of long duration as the exact site for the digesters is not known at this time. The impact of construction noise on this and forest habitat at Discovery Park would be negative but nimor, limited in extent and short-term as animals frightened away by noise would return to the area once construction is complete. Effects on terrestrial habitats of holding tank construction are discussed in the Regional EIS.

Shoreline habitats. Overflows would be reduced 99% to Lake Washington and 84% to Lake Union/Ship Canal relative to Alternative B levels. Loadings of solids, BOD, pathogens, metals, ammonia, nutrients and toxicants would be greatly reduced. The benefit to the shoreline areas of Lake Washington and the Ship Canal would probably be moderate and long-term. The effects of former inputs of metals and toxicants are irreversible, but loadings of these chemicals would stabilize.

The intertidal. Elements of Alternative C affecting the intertidal area are a reduction in CSO's at West Point, and a minor (25%) increase at Elliott Bay and upgrading of effluents to enhanced primary treatment levels in summer. Limited data available (at Denny Way) on effects of CSO to saltwaters indicate adverse effects are moderate-to-severe, limited in extent, of long duration and probably irreversible for metals and toxicants.

Upgrading to enhanced primary treatment allows for some reduction in BOD, solids, metals and phosphates loads. The levels of nitrates would be as at present, however, and it is these nutrients that can become limiting in the Sound. As effluent from West Point enters the intertidal occasionally, the potential enrichment effect of effluents would continue.

At the same time, CSO's could enter the intertidal along the north shore of Elliott Bay and West Point's south beach in wet weather, due to water circulation driven by Duwamish outflow and tides, and to the shallow discharge depth of the overflow (50 feet). The possible effect, based on limited existing data (Metro Staff, 1976), could be a major decrease in the kinds and numbers of organisms in the outfall plume's path, limited in extent, but of long duration as flows would be intermittent but continuing. The effects on the organisms' environment due to metals and toxicants in the overflow would be irreversible.

Since chlorination facilities at West Point would be as presently operated, overchlorination and underchlorination could probably continue. Underchlorination could maintain fecal coliform levels in excess of state shellfish standards, and overchlorination could produce chlorine residues potentially toxic to intertidal organisms. In wet weather, a new large overflow could substantially increase pathogen levels in the intertidal and nearshore waters from the outflow point to West Point, especially on an ebb tide.

Puget Sound. Effects on nearshore and offshore waters from Alternative C would be from effluent flows and slightly reduced loads, the effects of one new outfall on Elliott Bay, and continuation of chlorination practices. Nutrient loads from effluent would continue at baseline levels, but would increase from the Interbay CSO outfall such that potential over-enrichment problems could continue or increase at West Point.

Offshore phytoplankton and zooplankton would continue to be affected by nutrients and metals in dispersing effluent plumes, such that productivity extremes would continue to be affected.

The distribution of some nearshore and offshore benthic organisms, which does appear to be correlated with the typical plume position for West Point effluent, would be maintained. Advanced primary removes solids and BOD so the overall loads would be 20% lower than Alternative B.

Offshore and nearshore free-swimming organisms may continue to be occasionally affected if they swim into or through an effluent patch, or if they feed in nearshore areas at night. The effect is considered to be minor, limited in extent to plume areas and of short duration; exposure is intermittent.

The composition, diversity and abundance of fishes off West Point would probably change little as overall loads to the Sound through the outfalls would decrease slightly (about 20%). The incidence of tumorous flatfish at West Point, to the extent the effluent and perhaps the pipe itself are involved, would probably not change. The effect is considered to remain adverse, major, limited in extent to outfall areas, of long duration and probably reversible.

A new outfall would also be constructed at the north side of Elliott Bay, carrying combined sewer overflows from the Lake Washington and Ship Canal areas. The annual flow is expected to be about 90 million gallons per year, discharged 1200 feet offshore at a depth of 50 feet just west of Terminal 91 (see Figure 3-7). Elliott Bay is a poorly-flushed deep basin in which winter winds tend to hold surface waters against the waterfront and mixing is slow. The effluent could be carried to the West Point area, in keeping with prevailing currents driven by Duwamish outflow and tides. The impacts of a large new combined sewer effluent point source on nearshore organisms are unknown, but could be similar to those at overflows samples (Metro Staff, 1976): adverse, major but limited in extent, long-term and irreversible for metals and toxicants.

Commercial and sport fisheries. Reducing sewer overflows to Lake Washington, Lake Union/Ship Canal would improve the quality of these waters important as migration, spawning and rearing areas to migrating salmonids. The benefit is considered to be moderate, extensive in the waters, and long-term for fish populations. At the same time, Elliott Bay would receive 25% more CSO's plus up to 250 mgd of wet weather effluent (primary treated). The adverse effect on the Elliott Bay-Duwamish Green River fish runs and resident fish populations is unknown. The effect would be limited in Elliott Bay, and of long duration and reversible except for metals and toxicants.

Freshwater environments. CSO control under Alternative C would be a moderate benefit to freshwater environments. No Kenmore parallel is planned under this alternative.

1. Lake Washington. An almost complete (99%) reduction of CSO to this lake would mean a moderate long-term benefit to limited areas of the western shore of the lake, including salmon spawning areas and perhaps bathing beaches which record high bacterial counts after a storm overflow. Offshore organisms which are probably affected less by overflows would in turn be benefited less by CSO control. Metals and toxicants already in the lake would continue to affect the shoreline biota, however.

2. Green Lake. The benefit of CSO control would probably be minor-to-negligible as other inputs dominate the lake's conditions.

3. Lake Union/Ship Canal. The magnitude of the impacts of overflows on the biota in this water are unknown. How much of the observed problems can be attributed to overflows has not been determined. A reduction would clearly be a benefit, but of undeterminable magnitude. As this water is

an important salmonid migration route, major overflow reductions of 84% are considered to have a moderate positive impact, extensive in the water body and of long duration.

Rare and endangered species. No impact is expected as no listed endangered species are recorded from the study area. Sensitive habitats, which include salmon spawning and rearing areas, fish migration routes, waterfowl resting areas and lake shallows have been discussed in previous sections.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional EIS on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative C has a negative impact on some human environment factors, and some positive impacts.

Land use. The only new construction at West Point which occurs under Alternative C is of two new chemical feed tanks to the northeast of the existing facility, as indicated in Figure 3-7. This would not greatly increase the amount of land used, and occurs in an area on which construction would have little impact. This is considered adverse, minor, long-term, local, reversible and definite.

Agency goals. Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether the position of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would provide an open space of quiet and tranquility for the citizens of Seattle; and whether the facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out parenthetically that the West Point facility was constructed long before the Discovery Park land was acquired from the Fort Lawton Military Reservation.

Employment and costs. Employment and cost impacts are not analyzed in the Regional EIS.

Social, recreational, and cultural. Under Alternative C, the West Point facility would expand in its present location, keeping restrictions on the recreational use of the West Point area. Because of the location of a fence, the beach north of the facility cannot be used at high tide. The sludge basin discourages use of the beach to the south of the facility. Site location at West Point keeps the Interbay site free from development.

This alternative does not comply with the wish of 60% of the 377 Magnolia area people polled that secondary treatment be implemented. This impact is considered adverse, major, long-term, reversible, and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by former construction. No historical sites are in the affected area.

Health and safety. There may be health risks associated with the consumption of shellfish due to the continued discharge of primarily treated waste, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U. S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction safety risk would be as for any other similar construction - with safety-conscious procedures there should be only a slight chance of accidents.

Aesthetics and nuisance. The West Point wastewater treatment facility is well designed with respect to aesthetics. It lies low, is clean, and is surrounded by well-kept grass. Few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs. Only 10% of 377 persons interviewed by Gerhardt Research were opposed to the location of the West Point facility. The additional sludge digesters have been placed such that they are not visible behind the bluff at Discovery Park. These impacts would be adverse, minor, long-term, local, reversible at great cost, and definite.

The noise and traffic of sludge trucking is a minor nuisance which did not seem to bother many people. Some people were unaware of the route the trucks traveled (HRPI, 1976). This is expected to continue as present.

CSO's have been dealt with in the Regional EIS and in the water quality section of this EIS.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative does not meet the requirements of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

While chlorine feed is residual paced at West Point, the residual is measured a short distance downstream of the chlorine feeding point and, therefore, does not reflect the actual concentrations before discharging into Puget Sound. Therefore, the exact chlorine dosage required to provide adequate disinfection and the extent of disinfection cannot be determined. Installing a chlorine contact tank would maximize the effectiveness of chlorination treatment.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, this facility would occasionally receive slugs of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

The sludge lagoon could be removed and the beach restored. This action would also eliminate any effects of the structure on longshore sediment transport. The existing access road south of the sedimentation tanks could be rerouted and the existing parking lot removed to increase usable public space at the south beach. A large landscaped earth-sludge berm approximately 20 feet high could be located between public activities and the plant. Increased planting along the entrance road would enhance visual screening. The berms can be developed as visual extensions of the bluff. The remainder of the plant could be also surrounded by landscaped earth-sludge berms; new digesters to the north could be partially depressed and "buried" by berms. These are shown in Figure 3-7.

Possible sludge truck traffic could be isolated along the southeastern property line between the plant and bluff to minimize visual and noise intrusion. The northern portion of the Metro property could be developed in a manner compatible with park objectives. Both a saltwater marsh fed by a new channel through the existing seawall, and a freshwater marsh fed by existing streams from the bluff are illustrated as possibilities; a range of other possibilities and configurations is conceivable.

Public access along the entire shoreline could be maintained and enhanced. These landscaping measures are developed in more detail in the Draft Facility Plan.

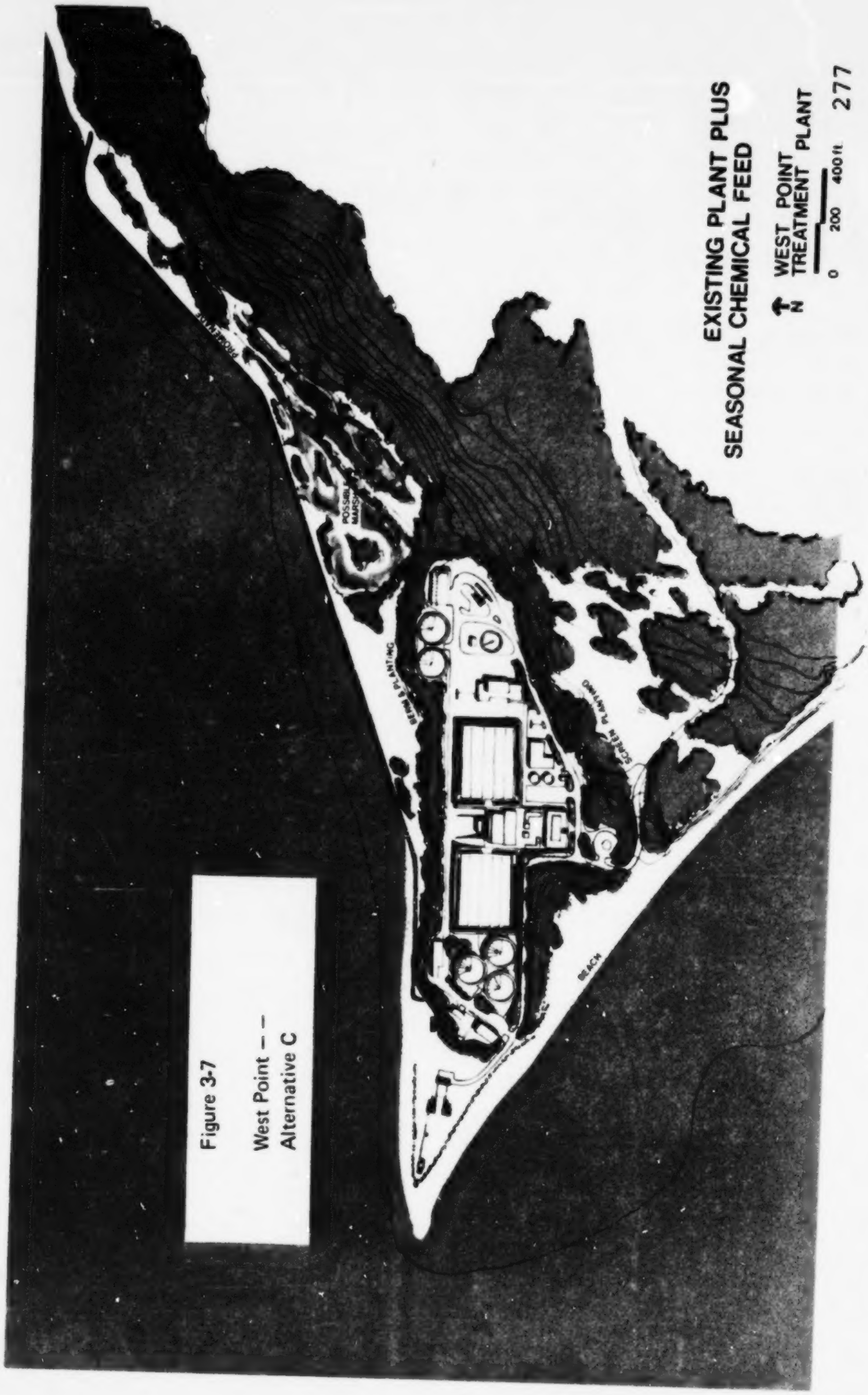
Under this alternative, a mitigation measure for controlling solid and metal loads in effluent water would be to use the enhanced primary treatment of alum year round, rather than just in the summer.

The potential effects of a large new CSO outfall to poorly-flushed Elliott Bay could be mitigated by pre-construction analysis of existing sediments, current patterns and velocities, water quality and biota.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will wtill be a temporary nuisance.


EXISTING PLANT PLUS
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0 200 400 ft
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SCREEN PLANTING
BEACH

277

Figure 3-7

West Point – –
Alternative C

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Primary effluent effect on water quality. This alternative does not implement secondary treatment; the water degradation of Puget Sound would continue.

Noncompliance with PL 92-500. Public Law 92-500 requires the installation of secondary treatment. This alternative does not comply.

Land use. Land is required in all alternatives; the question is: where will the impact occur?

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest?

Operation and maintenance and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

ALTERNATIVE D

Alternative D emphasizes abatement of combined sewer overflows to the areas identified as the most sensitive to overflow effects, namely, Lake Washington and Lake Union.

Service Area

The West Point service area, shown in Figure 3-1, would be reduced relative to Alternative B and identical to Alternative C for dry weather flows. Wet weather flows from the Duwamish area would also be routed to West Point. Part of the North Lake Washington and all of the North Lake Sammamish flow would be transferred to Renton. Overall, the dry weather flow would be 139 mgd, with 350 mgd in wet weather.

Treatment Plant

The West Point plant would provide enhanced primary treatment for summer flows, beginning in 1985 and primary treatment for wet weather flows, as in Alternative C. The plant would look as in Alternative C (Figure 3-5). Effluent quality of 75 mg/l BOD and 30 mg/l solids would be discharged to Puget Sound in summer, and 115 mg/l BOD plus 110 mg/l solids in winter.

Combined Sewer Overflow Control

By provision of both Metro and city holding and transport facilities, overflows to Lake Washington would be controlled to one event per year, and in Lake Union to 10 events per year. No control of other overflow beyond existing CATAD is provided in this alternative. Projected annual pollutant load reduction by receiving waterbody of this alternative are discussed under impacts.

Combined sewer overflow control facilities are phased through 1991, priority being given to Lake Washington. Three Metro and 17 City of Seattle holding tanks would be built in the West Point service area plus four City of Seattle pump stations, one Metro pump station and the Metro North interceptor parallel with a new outfall to Elliott Bay.

Sludge

Solids handling facilities would be expanded as necessary for the chemical solids from enhanced primary treatment. Renton sludge would be treated at Renton. Richmond Beach sludge would be dewatered at West Point.

Dewatered sludge from West Point would be trucked to Cedar Hills landfill for disposal and to Pack Forest for recycling research.

Impacts

Geology, Soils and Topography

Under Alternative D two digesters would be built at West Point to allow construction of the foundations for these new digesters. As the site is covered by fill, which tends to be unstable, piling and dewatering may be necessary for structural support. Potential earthquake damage to low structures on fill would be minor, extensive and short-term. Erosion would also be a minor, short-term problem of limited extent, as would changes in topography and soil profile. Shoreline fill would not be involved.

The impacts of holding tank construction are discussed in the Regional EIS.

Any impacts on longshore sediment transport due to the sludge lagoon would continue. Present information is insufficient to evaluate effects at this time.

Air Quality and Odors

Upgrading the West Point plant to enhanced primary treatment would slightly increase the potential for odors escaping. Odor problems at West Point would continue to be minor, limited in extent, and intermittent. Control of CSO's would reduce the frequency of CSO-derived odors. The benefits of CSO control and the impacts of holding tank construction are discussed more fully in the Regional EIS.

Water Quality

Alternative D includes enhanced primary treatment of West Point effluent, achieving a 25% decrease in BOD and solids, but a 21% increase in CSO flows and loads to Elliott Bay through a new outfall from Interbay. CSO's to Lake Washington would be reduced 83%, to the Ship Canal/Lake Union by about 50% (61% to Lake Union alone), as shown in Table 3-8, by transfer to Interbay.

Puget Sound. Nutrient loads would increase slightly due to the new CSO at Interbay of about 75 million gallons annually. Effluent nutrient impacts would remain at Alternative B levels as phosphate is never limiting in the Sound and nitrogen would not be effectively removed by the chemical precipitation process. Suspended solids would decrease overall, as the load removed from West Point effluent is 75 times larger than the increase due to the new CSO outfall at Interbay.

Alum precipitation would assist removal of pathogens and other microorganisms, but the burden of disinfection will remain with chlorine, which could be more effective if solids are reduced and disinfection practices are improved. Some improvement in microbiological quality could result from enhanced primary treatment. At the same time, a large new CSO outfall discharging about 75 million gallons per year at a depth of 50 feet some 1200 feet from shore would probably degrade microbiological water quality as the effluent surfaced along the north shore of Elliott Bay. In winter, winds tend to hold surface waters against the shore, and mixing is slow. Longshore currents driven by wet weather Duwamish outflow and by tides could carry the flow westward toward West Point. Microbiological quality of these waters would receive intermittent negative impacts of unknown but probably substantial magnitudes, of long duration as overflows would continue from year-to-year, and reversible.

The overflow would also add a new metals, toxicants, oil, and grease source to Elliott Bay and possibly to the area south of West Point. Heavy metals loads would decrease from West Point due to improved treatment, but other metal sources would not be affected. Offshore, metals removals are not likely to affect water quality, but could affect sediments and their reservoir of metals near outfalls. Toxicants attached to particulates would also be affected by chemical treatment. PCB's, which are probably from overflows, Duwamish outflow and dredge spoils, would probably not be reduced, except indirectly as a result of enforcement of the

Table 3-8

Annual CSO Pollutant Load -- Alternative D

Water Body Location	Baseline Alternative B			Alternative D		
	Volume (mil gal)	BOD (tons)	Solids (tons)	Volume (mil gal)	BOD (tons)	Solids (tons)
* Green Lake	--	--	--	--	--	--
* Lake Washington	22.4	5.58	20.4	3.76	0.94	3.41
* Portage Bay/Montlake Cut	228	59.3	241	147	36.5	133
* Lake Union	56.6	14.1	51.4	22.2	5.52	20.1
* Ship Canal/Salmon Bay	254	63.3	231	128	31.8	116
* Elliott Bay	358	89	325	433	108	392
Duwamish River	251	62	227	251	62	227
Puget Sound (Alki)	5.46	1.36	4.95	4.47	1.11	4.06
Total	1175.46	294.64	1100.75	989	246	896
Approximate Overall Service Area		0		16	17	19
* In West Point Service Area		0		20	21	23

Source: Metropolitan Engineers, 1977

Toxic Substances Act.

Lake Washington. CSO's to Lake Washington would be reduced 83%, resulting in a moderate improvement in the quality of nearshore waters of the lake. Loads of nutrients, solids, BOD, pathogens, oil and grease,metals and toxicants would be greatly reduced. Occasional health risks from coliform levels exceeding state bathing standards would probably be similarly reduced. Loads to the lake are small, relative to CSO's to other water bodies (Table 3-8), but Lake Washington is considered to be sensitive and CSO's are frequent.

Lake Union/Ship Canal. CSO's would be reduced by about 50% to this system, with 61% reduction in flows to Lake Union alone. As the overflows to these waters are 24 times larger than to Lake Washington, and the latter is orders of magnitude larger than the Ship Canal/Lake Union system. This is considered to be a moderate-to-major benefit, extensive in this water system, of long duration and reversible in .reducinc BOD solids, nutrients, turbidity, oil and grease, metals, toxicants and pathogens loads.

Green Lake. Even with some CSO control the benefit to this small lake would be negligible, as other inputs determine water quality.

Groundwater. Groundwater levels could have a minor, limited but long-term adverse impact if dewatering is necessary at the construction site.

Biology

Alternative D calls for discharge of primary effluent treated with alum to precipitate solids. Effluent discharged to Elliott Bay from a new overflow outfall could move along shore to West Point. Its impact on West Point areas is unknown at present. Two digesters would be built at West Point. Partial CSO control would help relieve pressures on biota in Lake Washington, Lake Union/Ship Canal and near West Point. Effluent flows at West Point would be essentially the same as in Alternative B, but BOD and solids would be reduced 25% below baseline levels.

Terrestrial habitats. The effect on terrestrial habitats at West Point is assumed to be minor, limited in extent but of long duration, as the exact site for the digesters is not known at this time. The impact of construction noise on this and forest habitat at Discovery Park would be negative but minor, limited in extent and short-term as animals frightened away by noise would return to the area once construction is complete. Effects on terrestrial habitats of holding tank construction are discussed in the Regional EIS.

Shoreline habitats. Overflows would be reduced 83% to Lake Washington, about 50% to Lake Union/Ship Canal, from Alternative B levels. Loadings of solids, BOD, pathogens, metals, ammonia, nutrients and toxicants would be greatly reduced. The benefit to the shoreline areas of Lake Washington and the Ship Canal would probably be moderate-to-major, and long-term. The effects of former inputs of metals and toxicants, are irreversible, but loading of these chemicals would stabilize.

Marshes along the Ship Canal at Union Bay and Portage Bay would receive about 40% less overflow loadings and flows, a benefit considered to be moderate-to-minor. The magnitude of the overall influence of CSO's on ecological communities in this water are unknown. CSO control would probably be a moderate-to-minor benefit to the biota of the immediate overflow areas assuming the data on Roanoke (Metro Staff, 1976) are typical. The remaining overflows would continue to have a negative, limited, long-term impact.

The intertidal. Elements of Alternative D affecting the intertidal area are a reduction in CSO at West Point, minor (21%) increase at Elliott Bay, and upgrading of effluents to enhanced primary treatment levels. Limited data available (at Denny Way) on effects of CSO to saltwaters indicate adverse effects are moderate-to-major, limited in extent, of long duration and probably irreversible for metals and toxicants.

Upgrading to enhanced primary treatment allows for some reduction in BOD, solids, metals, and phosphates loads in effluent. The levels of nitrates would be as at present, however, and it is these nutrients that can become limiting in the Sound. As effluent from West Point enters the intertidal occasionally, the potential enrichment effect of effluents would continue.

Continued nutrient (nitrogen) loads would maintain enrichment effects on intertidal algae and algae grazers. Metals removal with enhanced primary treatment is somewhat, but not consistently, better than with primary. Metals levels at outfall areas would continue to be higher than at background stations, especially as chemical precipitation would be employed at the treatment facility only in summer. Slugs of mercury, cadmium, and arsenic go through West Point on occasion year-round.

At the same time, CSO's could enter the intertidal along the north shore of Elliott Bay and perhaps West Point's south beach in wet weather, due to water circulation driven by Duwamish outflow, and tides and to the shallow discharge depth of the overflow (50 feet). The possible effect, based on limited existing data (Metro Staff, 1976), could be a major decrease in the kinds and numbers of organisms in the outfall plume's path, limited in extent, but of long duration as flows would be intermittent but continuing. The effects on the organisms' environment due to metals and toxicants in the overflow would be irreversible.

As chlorination facilities at West Point would be as presently operated, overchlorination and underchlorination could probably continue. Underchlorination could maintain fecal coliform levels in excess of state shellfish standards, and overchlorination could potentially produce chlorine residues potentially toxic to intertidal organisms. In wet weather, a new large overflow at Interbay could substantially increase pathogen levels in the intertidal and nearshore waters from the outflow point to West Point, especially on an ebb tide.

Puget Sound. Effects on nearshore and offshore waters from Alternative D would be from effluent flows and slightly reduced loads, the effects of a new outfall on Elliott Bay and continuation of chlorination practices. Nutrient loads from effluent would continue at Alternative B levels but would increase from the Interbay CSO outfall such that potential over-enrichment problems could continue or increase at West Point.

Offshore phytoplankton and zooplankton would continue to be affected by nutrients and metals in dispersing effluent plumes, such that productivity extremes would continue to be affected.

The distribution of some nearshore and offshore benthic organisms, which does appear to be correlated with the typical plume position for West Point effluent, would be maintained. Advanced primary removes solids and BOD, so the overall loadings would be 25% lower than baseline (B).

Offshore and nearshore free-swimming organisms may continue to be occasionally affected if they swim into or through an effluent patch, or if they feed in nearshore areas at night. The effect is considered to be minor, limited in extent to plume areas and of short duration, as exposure is intermittent.

The composition, diversity and abundance of fishes off West Point would probably change little as overall loads to the Sound through the outfalls would decrease slightly (about 25%). The incidence of tumorous flatfish at West Point, to the extent the effluent and perhaps the pipe itself are involved, would probably not change. The effect is considered to remain adverse, major, limited in extent to outfall areas, of long duration and probably reversible.

As discussed above, a new outfall at the north side of Elliott Bay would carry combined sewer overflows from the Lake Washington and Ship Canal areas. The annual flow is expected to be over 75 million gallons per year, discharged 1200 feet offshore at a depth of 50 feet just west of Terminal 91. Elliott Bay is a poorly-flushed deep basin in which winter winds tend to hold surface waters against the waterfront and mixing is slow. The effluent could be carried to the West Point area, in keeping with prevailing currents driven by Duwamish outflow and tides. The impacts of a large new combined sewer effluent point source on nearshore organisms are unknown, but could be similar to those at overflows sampled (Metro Staff, 1976): adverse, major but limited in extent, long-term and irreversible for metals and toxicants.

Commercial and sport fisheries. Reducing sewer overflows to Lake Washington, Lake Union/Ship Canal would improve the quality of these waters important as migration, spawning and rearing areas to salmonids. The benefit is considered to be moderate-to-major, extensive in the waters, and long-term for fish populations. At the same time, Elliott Bay would receive 21% more CSO's. The adverse effect on the Elliott Bay-Duwamish/Green River fish runs and resident fish populations could be substantial, as these animals may be stressed by existing water quality conditions. The effect would be limited in Elliott Bay, and of long duration and reversible except for metals and toxicants.

Freshwater environments. CSO control under Alternative D would be a moderate benefit to freshwater environments. No Kenmore parallel is planned under this alternative.

1. Lake Washington. A major (83%) reduction of CSO to this lake would mean a moderate long-term benefit to limited areas of the western shore of the lake, including salmon spawning areas and perhaps bathing beaches which record high bacterial counts after a storm overflow. Offshore organisms which are probably affected less by overflows, would in turn be benefited less by CSO control. Metals and toxicants already in the lake would continue to affect the shoreline biota, however.

2. Lake Union/Ship Canal. The magnitude of the impacts of overflows on the biota in this water are unknown. How much of the observed problems can be attributed to overflows has not been determined but these small waters receive 24 times the CSO flows to Lake Washington. A reduction would clearly be a benefit, but of undeterminable magnitude. As this water is an important salmonid migration route, major overflow reductions of about 50% are considered to have a moderate positive impact, extensive in the water body and of long duration.

Rare and endangered species. No impact is expected as no listed endangered species are recorded from the study area. Sensitive habitats have been discussed in previous sections.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional EIS on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative D has a negative impact on some human environment factors, and some positive impacts.

Land use. The only new construction which occurs under Alternative D is of two chemical feed tanks to the northeast of the existing facility, as indicated in Figure 3-7. This would not greatly increase the amount of land used, and occurs in an area which has little impact. This is considered adverse, minor, long-term, local, reversible and definite. Impacts of holding tank construction are discussed in the Regional EIS.

Agency goals. Impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether the position of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would provide an open space of quiet and tranquility for the citizens of Seattle; and whether this facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out parenthetically, that the West Point facility was constructed long before the Discovery Park land was acquired from the Fort Lawton Military Reservation.

Employment and costs. Employment and cost impacts are analyzed in the Regional EIS.

Social, recreational and cultural. Under Alternative D, the West Point facility would expand in its present location, keeping restrictions on the recreational use of the West Point area. Because of a fence, the beach north of the facility cannot be used at high tide. The sludge basin discourages use of the beach to the south of the facility. Site location at West Point keeps the Interbay sites free from development.

This alternative does not comply with the wish of 60% of the 377 Magnolia area people polled that secondary treatment be implemented. This impact is considered adverse, major, long-term, reversible and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by former construction. No historical sites are in the affected areas.

Health and safety. There may be health risks associated with the consumption of shellfish due to the continued discharge of primarily treated waste, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U. S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction safety risk would be as for any other similar construction; with safety-conscious procedures there should be a slight chance of accidents.

Aesthetics and nuisance. The West Point wastewater treatment facility is well designed for consideration of aesthetics. It lies low, is clean, and is surrounded by well-kept grass. Few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs. Only 10% of 377 Magnolia area persons interviewed by Gerhardt Research were opposed to the location of the West Point facility. Additional sludge digesters have been placed such that they are not visible from the bluff at Discovery Park. These impacts would be adverse, minor, long-term, local, reversible and definite.

The noise and traffic of sludge trucking is a minor nuisance which did not seem to bother many people. Some people were unaware of which route the trucks traveled (HRPI, 1976). This is expected to continue as present.

CSO's were dealt with in the Regional EIS, and in the water quality section of this EIS.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative does not meet the secondary treatment requirement of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

While chlorine feed is residual paced at West Point, the residual is measured a short distance downstream of the chlorine feeding point and therefore does not reflect the actual chlorine residual before discharging into Puget Sound. Therefore the exact chlorine dosage required to provide adequate disinfection and the extent of disinfection cannot be determined. Installing a chlorine contact tank would maximize the effectiveness of chlorination treatment.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, this facility would occasionally receive slugs of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such gases as methane and noxious sulfur dioxide are emitted.

The sludge lagoon could be removed and the beach restored. This action would also eliminate any effects of the structure on longshore sediment transport. The existing access road south of the sedimentation tanks could be rerouted and the existing parking lot removed to increase usable public space at the south beach. A large landscaped earth-sludge berm approximately 20 feet high could be located between public activities and the plant. Increased planting along the entrance road would enhance visual screening. The berms can be developed as visual extensions of the bluff. The remainder of the plant could be also surrounded by landscaped earth-sludge berms; new digesters to the north could be partially depressed and "buried" by berms. These were shown previously in Figure 3-7 (Alternative C).

Possible sludge truck traffic could be isolated along the southeastern property line between the plant and bluff to minimize visual and noise intrusion. The northern portion of the Metro property could be developed in a manner compatible with park objectives. Both a saltwater marsh fed by a new channel through the existing seawall, and a freshwater marsh fed by existing streams from the bluff are illustrated as possibilities; a range of other possibilities and configurations is conceivable.

Public access along the entire shoreline could be maintained and enhanced. These landscaping measures are developed in more detail in the Draft Facility Plan (Metropolitan Engineers, 1977).

Under this alternative, a mitigation measure for controlling solid and metal loads in effluent water would be to use the enhanced primary treatment of alum year round, rather than just in the summer.

The potential effects of a large new CSO outfall to poorly-flushed Elliott Bay could be mitigated by preconstruction analysis of existing sediments, current patterns and velocities, water quality and biota.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Primary effluent effect on water quality. This alternative does not implement secondary treatment; the water degradation of Puget Sound would continue.

Noncompliance with PL 92-500. Public Law 92-500 requires the installation of secondary treatment. This alternative does not comply.

Land use. Land is required in all alternatives; the question is: where will the impact occur.

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest.

Operation and maintenance and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

ALTERNATIVE E
SECONDARY

Alternative E would provide secondary treatment at West Point and transfers the dry weather Carkeek Park flows to West Point.

Service Area

The West Point plant would serve its present area and pick up increased flows from growth in the North Lake Washington sewerage service subarea.

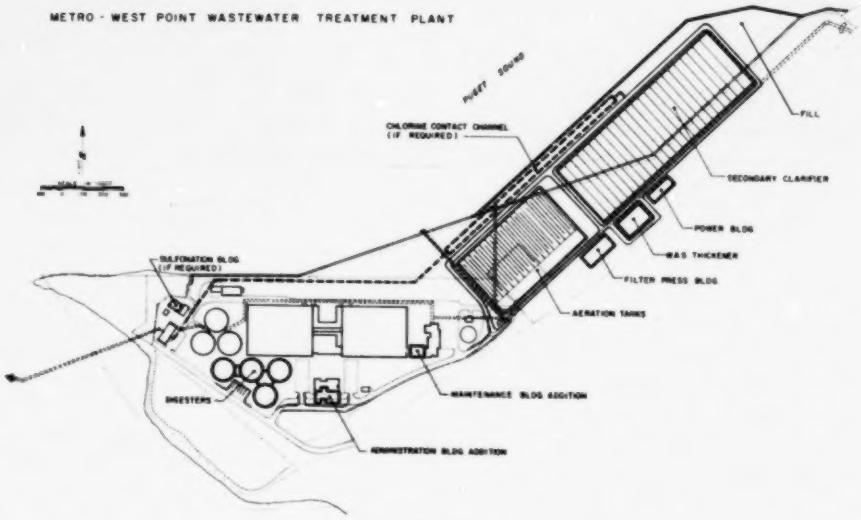
Service area modifications in addition to phasing out Carkeek Park include annexing of the North Lake Sammamish service area to Renton via the Redmond connection and transferring Val Vue from Renton. To serve increased North Lake Washington flows requires construction of the Kenmore parallel interceptor. To transfer Carkeek flows to West Point requires construction of the Carkeek-West Point interceptor.

Treatment Plant

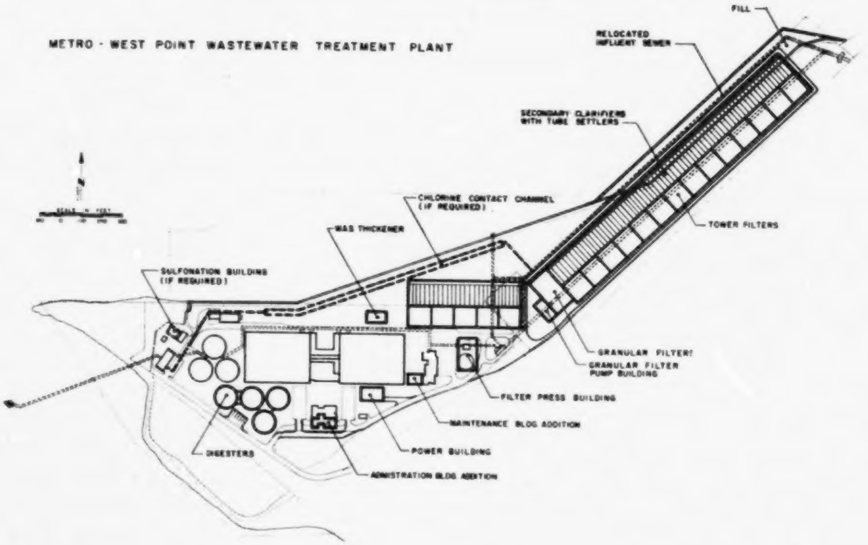
The plant would treat 142 mgd dry weather, 350 mgd wet weather flows under this alternative and upgrade facilities to secondary treatment by 1985.

The West Point major secondary treatment layout is shown in Figure 3-8. New structures would include secondary aeration basins, clarifiers, a chlorine contact tank and sulfonation building. Air activated sludge is proposed in the Facility Plan. Alternate West Point secondary facilities' other options include oxygen activated sludge or tower trickling filters followed by granular media filtration. All layouts involve shoreline fill, although less fill is required if the tower trickling filter is constructed. The secondary activated sludge process as proposed in the Facility Plan would require 12 acres of shoreline fill.

In 1985, the Carkeek Park dry weather flows would be transferred to West Point. Carkeek Park would treat only storm flows. Carkeek could be abandoned in 1995 with the completion of improvements to the City of Seattle storm


METRO - WEST POINT WASTEWATER TREATMENT PLANT
PUGET SOUND
CHLORINE CONTACT CHANNEL (IF REQUIRED)
FILL
SECONDARY CLARIFIER
POWER BLDG
WAS THICKENER
FILTER PRESS BLDG
AERATION TANKS
SULFONATION BLDG (IF REQUIRED)
DIGESTERS
MAINTENANCE BLDG ADDITION
ADMINISTRATION BLDG ADDITION

SECONDARY
(AIR ACTIVATED SLUDGE)


METRO - WEST POINT WASTEWATER TREATMENT PLANT
FILL
RELOCATED INFLUENT SEWER
SECONDARY CLARIFIERS WITH TUBE SETTLERS
CHLORINE CONTACT CHANNEL (IF REQUIRED)
WAS THICKENER
TOWER FILTERS
SULFONATION BUILDING (IF REQUIRED)
GRANULAR FILTERS
GRANULAR FILTER PUMP BUILDING
FILTER PRESS BUILDING
MAINTENANCE BLDG ADDITION
POWER BUILDING
DIGESTERS
ADMINISTRATION BLDG ADDITION

SECONDARY
(TOWER TRICKLING FILTER)

Figure 3-8
West Point Layouts – – Alternative E

flow system.

Combined Sewer Overflow Control

Combined sewer overflow control is not a feature of Alternative E. CSO's to Lake Washington, Lake Union, Ship Canal, Portage Bay and Elliott Bay would remain approximately the same as in Alternative B.

The current program of maximizing available in-line storage capacity for control of combined sewer overflows would be continued by construction of the Montlake and Third Avenue West regulator stations. Excessive infiltration/inflow would be removed from the Carkeek Park, City of Seattle, and City of Lake Forest Park service areas.

Sludge

Additional sludge digestion would be provided at West Point to handle the increased sludge production. Renton sludge would be removed from West Point and treated elsewhere. Richmond Beach digested sludge would be trucked to West Point for dewatering, and dewatered sludge from West Point trucked to Cedar Hills landfill for disposal and to Park Forest for recycling.

Impacts

The direct impacts projected under this alternative to the year 2005 are described below. Secondary impacts are discussed in the Regional EIS which is Volume I of the series.

Geology, Soils and Topography

Alternative E requires expansion of the West Point facility, including shoreline fill. The installation of activated sludge facilities for secondary wastewater treatment would require a total of 54 acres, 12 of which would be shoreline fill. Some construction may be at the base of the unstable bluffs bordering the site to the east. Building at the base of the bluff could have potentially major adverse effects from landslides. With retaining walls or upland drainage and fill at the toe of the slope, the site would probably be sufficiently stable to permit construction at the base. The effect is judged to be minor as mitigated, limited in extent and a long-term problem.

Earthquake damage is considered to be potential for structures on fill in this area. Low structures, such as those planned, would be susceptible to damage primarily from differential settlement of soils caused by ground shaking. It is assumed that structures would be designed to withstand such events. The impact could still be major, but would be limited in extent and of short duration.

Erosion and deposition during construction could be major but limited in extent and of short duration. Shoreline fill could alter sand/sediment transport processes along the north shore of West Point. The magnitude of the effect depends on the duration of the construction period, the design of the fill area, the amount and quality of the fill, the depth of water at the fill site, tidal and weather conditions and the type of existing nearshore sediments. The fill would require some protection, such as riprap, to prevent its being eroded away. With these precautions, the erosion problem could be expected to be minor and limited but of long duration.

Any effects on shoreline sediment transport due to the sludge lagoon would continue. Not enough information is available at this time to evaluate the impact, however.

The construction of the Kenmore parallel interceptor would temporarily alter lake bottom and shoreline soil profiles and topography and increase nearshore erosion and siltation, as discussed in the Regional EIS.

The Carkeek-West Point interceptor would be laid in the West Point service area from south of Meadow Point along shore and finally across Salmon Bay. Construction would temporarily alter shoreline sediment and topography and increase nearshore erosion and siltation. The benthic sediment of Salmon Bay would be disturbed. The highly probable impact is judged to be severe but limited in extent, of short duration and reversible.

Air Quality and Odors

Emissions from construction of the secondary treatment facilities would be minor, limited, and of short duration. Dust raised during construction could be a major short-term problem. There would be an increased potential for odors escaping during the operation of the secondary treatment plant because secondary treatment plants are larger and more complex than primary plants, expose more water surface area to the air and subject the water to more perturbation. The odor problem is still considered to be minor, limited in extent, and intermittent, however. Various practical measures can be employed to control treatment plant odors and are discussed in the section on mitigation measures. Emissions from increased sludge truck trips and employee vehicle traffic are considered to be minor, limited in extent and of short duration due to the good air circulation on and near the site. Odors due to CSO's would increase as the system became overloaded. During construction of the Kenmore parallel and Carkeek-West Point interceptors, particulates and engine emissions would locally increase for a short time, as discussed in the Regional EIS.

Water Quality

Under Alternative E, secondary effluent would be discharged from West Point. Secondary treatment would reduce the discharge of BOD 81% and of suspended solids 75%. Discharge of heavy metals, PCB's and pesticides will decrease if these are associated with particulates. There would be no CSO control. There would be no effect on Puget Sound temperature, salinity, dissolved oxygen or BOD.

Puget Sound. Very minor reductions in nutrients from secondary treatment would be offset by continued contributions from CSO's. The overall adverse impact at West Point would continue to be moderate, because West Point effluent is believed to increase levels of primary productivity; limited in extent; long-term, because the discharge would continue through the planning period; and reversible.

Suspended solids loads at West Point would be reduced 74% due to secondary treatment, but CSO's would continue. The net positive impact would be minor; limited to West Point beaches; long-term, because the CSO's and discharge would continue through the planning period; and, except for metals and toxicants, reversible. CSO's would also continue to degrade microbiological quality, but as CSO's are relatively small near West Point, the overall adverse impact is judged to be minor; limited on West Point beaches; long-term, because CSO's are intermittent but continuing; and reversible. Heavy metals removal efficiencies would be substantially improved by secondary treatment, but metals would still be released to the Sound from CSO's and other sources not controllable by Metro wastewater facilities.

For toxic compounds, small improvements from secondary treatment would be offset by continued CSO's. The overall adverse effect would be minor, because the concentrations of toxicants and metals in West Point discharge and CSO's are not excessively high; limited to West Point beaches and nearshore areas; long-term, because the discharges would continue through the planning period; and irreversible because of the nondegradable character of these contaminants. With the enforcement of the Toxic Substances Act, the contribution of PCB's from the Duwamish area should begin to decline in 1978-1979, although PCB's already accumulated in Duwamish sediments will continue to exert adverse, toxic effects for a long time.

Lake Washington. The construction of the Kenmore parallel in the West Point service area, along the northwestern shore of Lake Washington, would affect the lake's water quality through increased turbidity and perhaps resuspension of metals and other materials associated with lake sediment. The effect is described in more detail in the Regional EIS.

The probable adverse effect on water quality is considered to be moderate, but highly limited in extent in the lake, of short duration and reversible as particles resettle.

Groundwater. Groundwater levels could have a minor, limited but long-term negative impact if dewatering is necessary at the construction site. West Point effluent, discharged to Puget Sound, is incapable of infiltrating groundwater.

Biology

The projected impacts due to implementation of Alternative E are described below in terms of terrestial habitats, shoreline habitats, the intertidal, Puget Sound, commercial and sport fisheries, freshwater environments, and rare or endangered species.

Terrestrial habitats. The effect on terrestrial biota at West Point and along Lake Washington would be from two sources: construction noise, which although minor would be of longer duration and greater magnitude than in previous action alternatives, and removal of habitat, which would be minor and limited but essentially permanent.

While the exact route of the Kenmore parallel interceptor is undecided, it is certain that some temporary minor disturbance of terrestrial habitats would occur due to noise and physical disturbance from construction activities. The impact is expected to be minor, but extending 4000 feet along the northwestern shore of Lake Washington. The effects would be short-term (for the duration of construction plus a short time afterwards) and reversible as the plants and animals could recolonize the area once construction is completed.

Shoreline habitats. In the absence of CSO control, marshes and shorelines would continue to suffer adverse effects of long duration from sediments, metals, pesticides, and toxicants in the overflows (assuming the Madison Park and Roanoke overflow data are typical). Plants and animals may be directly affected by toxic materials or may concentrate them in their tissues to levels toxic to predators. Salmon spawning areas, which require clean gravel, sand and groundwater seepage could be silted over. Oil and grease can coat skin, gills and other surfaces involved in oxygen transfer. Solids, BOD and nutrients could have moderate-to-major effects as well, but these would probably be short-term in nature.

The Kenmore parallel interceptor would also have major but limited and short-term negative impacts on the northwest shore of Lake Washington. It is assumed that the effects of the existing pipe have subsided and that the installation of a second pipe means a new perturbation to the system. The Kenmore parallel would locally destroy shoreline communities and probably frighten water birds, mammals and fishes away from the site during construction. The turbidity resulting from excavation would reduce plant activity and could possibly silt over salmon spawning areas. It is expected, however, that the plants and animals, with the possible exception of salmon, would re-establish themselves in time. The re-establishment of any salmon spawning areas affected would depend on how quickly the overlying sediment was carried away. Mitigation measures are discussed in a subsequent portion of this section. Further environmental analyses of possible impacts would be conducted prior to construction.

The intertidal. Overflows to Puget Sound and Elliott Bay would remain at present annual levels of 358 million gallons. Treatment plant effluent, which reaches adjacent beaches at least occasionally, would not increase in volume over Alternative B levels, but solids and BOD and perhaps metals and toxicants loads would be reduced 74% to 81%.

Nutrients, which appear to be implicated in increased growth rates of intertidal plants at West Point, would probably not be removed in significant amounts by secondary treatment of effluent and would therefore continue to enter Puget Sound at Alternative B levels. Bacterial and pathogen inputs from CSO's would continue and it is impossible to determine whether or not state bacterial standards for shellfish waters would be met.

The reduction in solids and BOD is considered to be a minor limited benefit, as effects from these parameters have not been demonstrated on the intertidal. Metals levels are higher in biota near the outfall area than at background stations, but are below existing standards. Toxicants levels in effluents are unknown, but removals in secondary treatment would be a positive effect. The benefit of metals and toxicants removals would be long-term, no matter how small.

It is not known which affects the intertidal community more overall - CSO's or effluents. Effluent quality is generally fairly well known (except for toxicants and trace elements), but its frequency of contact with the intertidal is not. CSO quality, on the other hand, is poorly known, but frequency of occurrence has been evaluated.

Alternative E also includes a Carkeek-West Point interceptor along the shore of Puget Sound and crossing Salmon Bay. Assuming the line would be underground, the disruption of the shoreline and/or intertidal habitat would be severe but temporary and limited. The substrate could be removed and much turbidity generated, similar to the effects of the Kenmore parallel on lake shores.

The intertidal north of West Point would be adversely affected by the placement of shoreline fill. The fill would cover an area formerly used as a raw sewage discharge area and sludge bed. Impacts include local displacement of benthic organisms and intertidal communities, and local loss of habitat for nearshore organisms. The immediate effect is judged to be adverse and major, but highly limited. Resident populations of benthic organisms would be permanently displaced from a localized area. Most would recolonize the area, attracted to the stable environment provided by the riprap. Intertidal flora would thus be affected in a minor way only, as they could reestablish on the rock. In time, intertidal organisms would be generally benefited by the improvement in effluent quality and the new habitat available.

The overall impact on intertidal shellfish beds could possibly be an improvement, as there are many more clams and geoducks south of West Point than north, and those could benefit from secondary treatment of effluent in terms of reduced solids loads. Some solids and fecal coliforms inputs would continue, however. CSO pollutant contributions would continue, but are generally smaller at West Point than at other beaches in the Metro area. It cannot be determined at present whether or not waters would then meet fecal coliform standards as other inputs are probably involved as well. At the same time, clam digging is prohibited at West Point by Discovery Park policy.

Puget Sound. Secondary treatment could mean improved disinfection - better kill with half the chlorine. With installation of a chlorine contact tank and dechlorination, disinfection could be optimized and potential effluent toxicity eliminated. BOD, solids, and probably metals and toxicant loads would be significantly reduced. Nutrient inputs would continue at baseline levels. CSO's to Puget Sound waters would be as in baseline conditions (B).

Nearshore and offshore phytoplankton would continue to be impacted by nutrients at present levels. The effect on zooplankton is not determinable. Offshore free-swimming and bottom dwelling organisms would be exposed to effluents containing substantially less solids, metals and toxicants.

The apparent influence of the effluent plume on benthic community composition would continue if due to nutrients; if due to solids and organic matter, the effects could decrease. The abundance of clams and worms at the 150 foot contour could become less pronounced.

The composition of fish assemblages near the West Point outfall may or may not change with secondary treatment. Some fishes may be attracted to the organisms on the pipe or to the pipe itself and would remain. Fishes which may be attracted by prey species favored by effluent caused changes in the bottom or the water column may also remain, although the waters and substrates would be affected less. Any effect on fishes would probably be short-term as many of these species are transient in this area. The slightly elevated incidence of tumors on flatfish may or may not change with secondary treatment of effluent as the cause or causes of the occurrence is unknown.

The Carkeek-West Point interceptor would cross Salmon Bay, which is critical for migratory fish species of the Lake Washington drainage basin and supports many of the marine species found in the Seattle area. The bay is also a resting and feeding area for migratory water birds. Alterations in the water quality due to laying of the pipe could increase migratory fish susceptibility to natural mortality and predation for the period of construction.

Commercial and sport fisheries. Salmonid runs up the Ship Canal through Lake Washington would continue to be affected by baseline levels of CSO's. Spawning areas in the lake could possibly be affected due to continued reductions in DO, overenrichment of nutrients and metals and toxicants loads. There are no data on effects of CSO's on Ship Canal water quality.

Juvenile fishes, including salmonids, which feed in nearshore areas occasionally affected by effluent, would potentially be benefited somewhat by the decrease in toxicants and metals loadings which could otherwise build up in their prey in time. The benefit is considered to be minor-to-moderate, and long-term as effluent flows and CSO's would continue.

The Carkeek-West Point interceptor would have a significant but limited and short-term adverse impact on salmonid migration during its construction through Salmon Bay. Construction timing could theoretically mitigate this impact, but at any given time of year some salmonid species are migrating upstream or downstream. The Kenmore parallel interceptor could affect Chinook salmon spawning areas in northwest Lake Washington.

Freshwater environments. Alternative E's effects on freshwaters are the result of increased CSO's to certain waters, such as Lake Washington and Lake Union/Ship Canal.

1. Lake Washington. CSO's to Lake Washington would be the same as in Alternative B. Loads of other parameters - metals, toxicants, nutrients - are assumed to be the same. The CSO volume to the lake would be about 1/20 that to the Lake Union/Ship Canal which is a smaller body of water. The effects on Lake Washington biota as a whole are probably minor as the lake is so large. The adverse effects on nearshore and shoreline life of CSO's and the construction of the Kenmore parallel have been described previously.

2. Green Lake. This small eutrophic lake has had pollution problems such as algae blooms which are probably caused by nutrients entering via subsurface seepage. A small increase in overflows to the lake would probably have a negligible effect on fish and waterfowl as these other

inputs appear to dominate environmental conditions.

3. Lake Union/Ship Canal. Under Alternative E, these waters would receive the same level of CSO's as in Alternative B. The contents of these overflows are assumed to be similar to those found at Roanoke (Metro staff, 1976). The Ship Canal/Lake Union are already stressed and are considered to be less sensitive than Lake Washington, but receive 20 times the overflow loads and volume. Biological life would continue to be stressed and hampered by: 1) fine, soft and polluted bottom mud resulting from years of raw sewage and other pollutant discharges, 2) oil spills and boat wastes as well as from CSO's (McGreevy, 1973). The negative effects on the biota would be a continuation of present impacts which are unknown, but probably moderate-to-severe, extensive in the waterway, long-term and irreversible for metals and toxicants.

Rare and endangered species. No rare or endangered species are recorded from the study area. Sensitive habitats have been described previously. Wildfowl rest areas and rare species are not expected to be affected. Pigeon guillemots rest in the cliffs adjacent to the sludge lagoon and would not be affected by expansion of the West Point facility into the meadow area to the northeast.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative E has a negative impact on some human environment factors, and some positive impacts.

Land use. Twelve acres of fill would be required to the northeast of the present West Point facility to accommodate the air activated or trickling filter basins. This fill would necessitate a permit from the Seattle Shorelines Master Plan, and the U.S. Army Corps of Engineers. The Master Plan discourages fill unless absolutely essential. The impact of fill would be adverse, possibly major, local long-term, reversible and definite.

Agency goals. Impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether expansion of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would "provide an open space of quiet and tranquility for the citizens of Seattle"; and whether this facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice."

Employment and costs. Employment and cost impacts are analyzed in the Regional EIS.

Social, recreational, and cultural. The expansion to the northeast of the facility would greatly limit the public access to the northern beach. This is considered adverse, minor, long-term, irreversible, local and definite.

This alternative complies with the wish of 60% of the 377 randomly selected Magnolia area people polled that secondary treatment be implemented. This impact is considered favorable, major, long-term, irreversible, and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by former construction. No historical sites are in the affected areas.

Health and safety. There may be fewer health risks associated with the consumption of shellfish due to the discharge of secondary effluent rather than primary, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction safety risk would be as for any other similar construction: with safety-conscious procedures there should be a slight chance of accidents.

Aesthetics and nuisance. The West Point wastewater treatment facility expansion would be well-designed for consideration of aesthetics. It would lie low, be clean, and be surrounded by well-kept grass and screening trees. Few odor complaints have been filed but odors could increase with secondary treatment. Visibility of the West Point facility from Discovery Park would be blocked by bluffs. Only 10% of 377 Magnolia area residents interviewed by Gerhardt Research were opposed to the location of the West Point facility. Although more were opposed to expansion, it was cautiously accepted as a "necessary evil."

The additional activated sludge basins have been placed such that they are not visible from behind the bluff at Discovery Park.

The tanks related to trickling filters, to the south of the facility, would be more visible from bluffs above, if this subalternative is adopted.

These aesthetic impacts would be adverse, minor, long-term, local, reversible and definite.

The noise and traffic of sludge trucks is a minor nuisance which did not seem to bother many people. Some people were unaware of which route the trucks traveled (HRPI, 1976). The sludge traffic is expected to approximately double under this alternative.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative meets the requirements of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

Pretreatment of industrial wastes could be provided before sewage enters the West Point and Carkeek Park plant. If current practices continue, these facilities would occasionally receive slugs of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

The possible silting over of salmon spawning grounds during the construction of the Kenmore parallel (Lake Line Option) called for under this alternative would cause impacts, both environmental and economical. Therefore it is recommended that an evaluation study be made on the Force Main Option to determine its possible impacts. Not enough information is presently available to consider this option.

If the Lake Line option is selected, the use of washed beach gravel as backfill in the construction of the Kenmore parallel interceptor could encourage salmon spawning, as in the construction of the North Mercer Island interceptor in 1970. Such a measure, however, would require the cooperation of both federal and state agencies to be successful. Construction timed to avoid salmon spawning and intragravel development would be limited to the months of March to September, probably increasing construction costs. Further environmental studies would be made before construction.

Further evaluation could be made of measures to eliminate shoreline fill, such as tall aeration basins or stacked clarifiers. Currently under this alternative, twelve acres of fill would be necessary to accommodate low-lying secondary treatment facilities.

The sludge lagoon could be removed, the area south of the existing digester could be kept open as a public activity area, and the access road and parking area could be relocated. Removing the lagoon would also eliminate any effects of the structure on longshore sediment transport.

The north beach area, including the new fill, could be substantially covered with a flat, screen-roofed, tank structure approximately 15 feet high, similar to the existing sedimentation tanks. Some possibility exists for creating a marsh habitat area between the tanks and bluffs which would give some isolation from more active public areas. These are indicated in Figure 3-9.

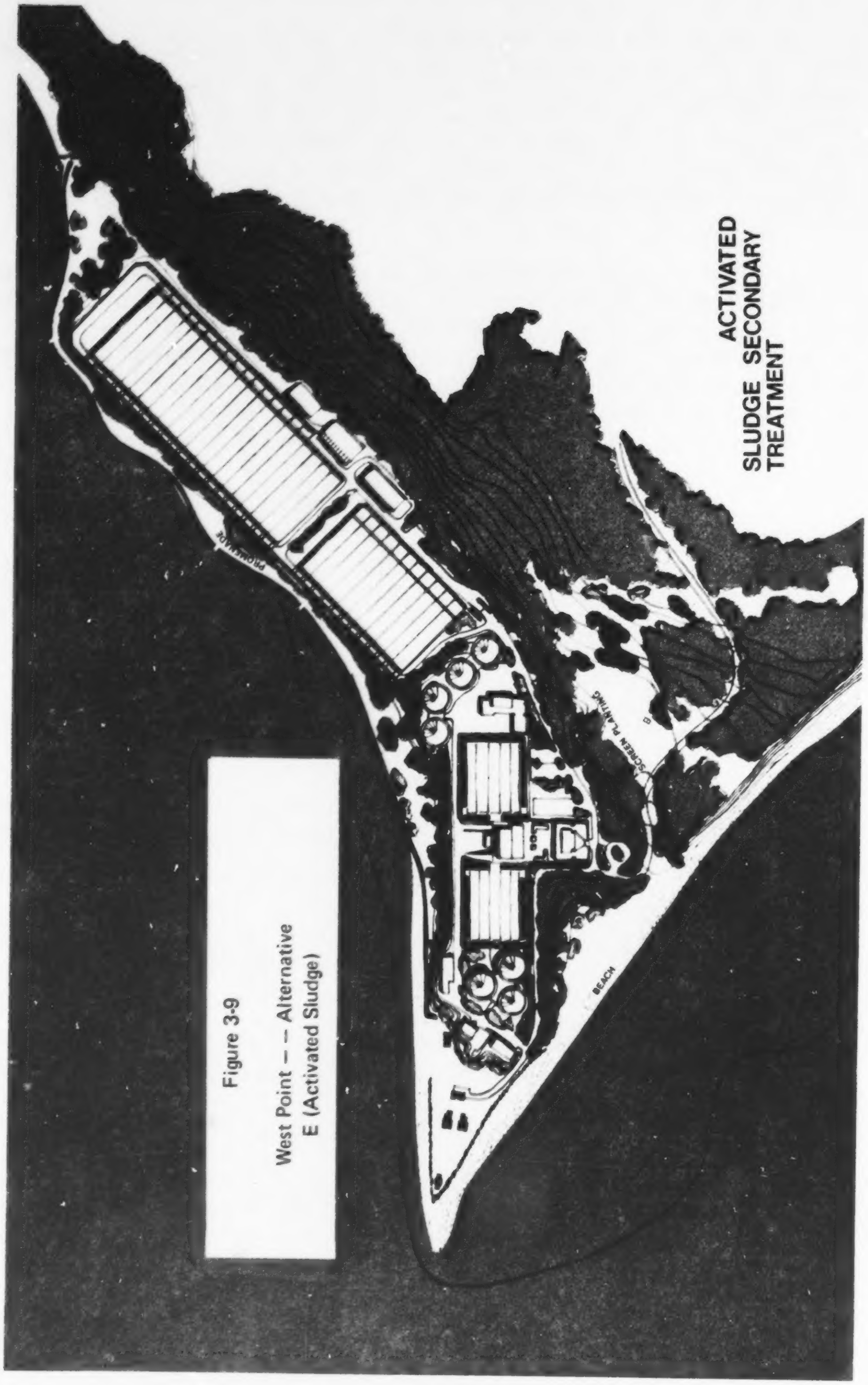

ACTIVATED SLUDGE SECONDARY TREATMENT
PROMENADE
SCREEN PLANTING
BEACH

Figure 3-9

West Point — — Alternative E (Activated Sludge)

A new seawall would be required. The seawall could be designed to create some intertidal area by stepping since the existing rocky intertidal area would be lost. The general shape of the wall could be designed as an undulating form as suggested in the site plan, (see Figure 3-9), rather than the existing straight wall. Such a scheme requires more fill but adds to the quantity and quality of public activity space.

Landscape treatment options vary from establishment of grass cover for erosion control (allowing natural succession to occur), to planting of a dense cover/screen of native shrubs and trees., Costs for these treatments vary substantially and are covered in the section on estimated costs of the Facility Plan.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance and disrupt soils and topography.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Combined sewer overflows. This alternative does not take adequate measures to control CSO's; they will still occur in wet weather.

Land use. Land is required in all alternatives; the question is: where will the impact occur?

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest?

Operation and maintenance and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated

Secondary effluent effect on water quality and biota. Nutrient inputs would continue at baseline levels; remaining solids, BOD and other loadings would continue to exert some effect on water quality and biota.

ALTERNATIVE F
SECONDARY/SOUTHERN STRATEGY

Alternative F provides secondary treatment at West Point and a new plant in the lower Duwamish serving the southern West Point service area and Alki, thus allowing Alki to be abandoned and flows to West Point reduced.

Service Area

Dry weather flows from Carkeek Park would be transferred to West Point, but dry weather flows for the Duwamish area would be served by a new plant to be constructed there. Carkeek could be abandoned in 1995 with the completion of improvements to the City of Seattle storm flow system.

East North Lake Washington and North Lake Sammamish would be transferred to Renton via the North Creek-Hollywood connection. As a result, West Point would treat 97 mgd dry weather, 350 mgd wet weather flows, similar to current conditions. Carkeek flows would be transferred to West Point via the Carkeek-West Point interceptor.

Treatment Plant

West Point would be upgraded to secondary by 1985. The plant layout for West Point is shown in Figure 3-10. The reduced West Point service area, and therefore loading, allows oxygen-activated sludge secondary treatment facilities as proposed in the Facility Plan to be constructed on the existing site with no shoreline fill. Air activated sludge could be accommodated but would require larger aeration tank area. A chlorine contact tank and sulfonation building would be constructed.

Combined Sewer Overflow Control

CSO's to Lake Washington, Lake Union, Ship Canal, Portage Bay and Elliott Bay would be reduced under this alternative (relative to Alternative B), corresponding with decreases in the West Point service area and increased peak capacity in southern areas. CSO's to fresh waters would be reduced about 31%, to salt waters by 15%, or 21% overall.

The current program of maximizing available inline storage capacity for control of combined sewer overflows would be continued by construction of regulator stations at Montlake and Third Avenue West.

Sludge

Renton sludge would be removed from West Point and treated at Renton. Richmond Beach digested sludge would be trucked to West Point for dewatering, and dewatered sludge from West Point and Duwamish would be trucked to Cedar Hills landfill for disposal or to Pack Forest for recycling research.

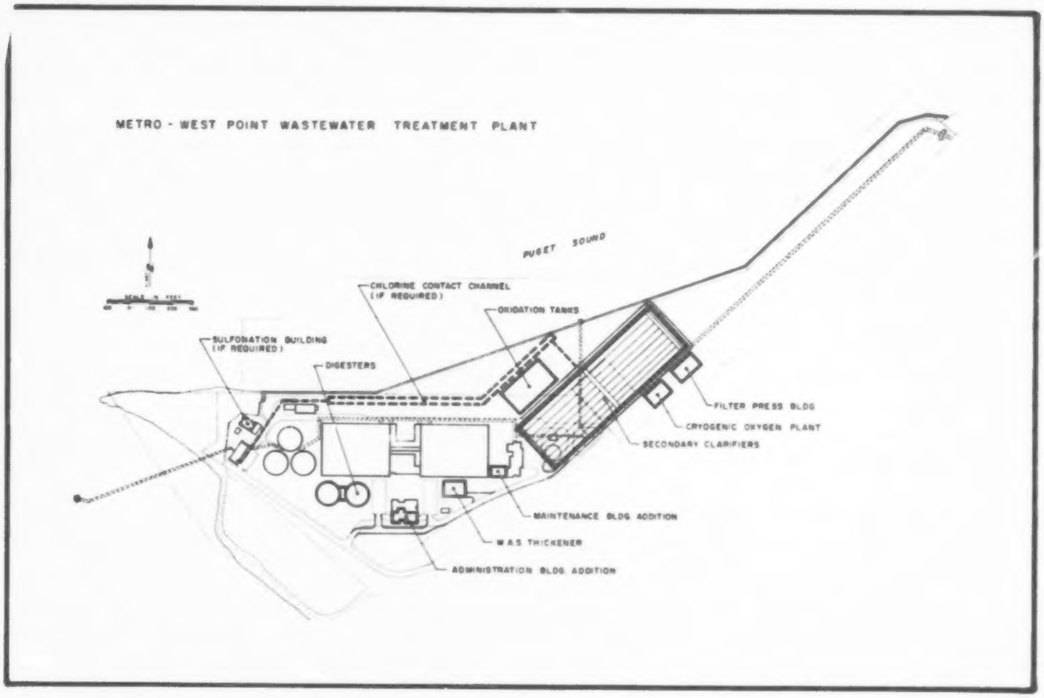

METRO - WEST POINT WASTEWATER TREATMENT PLANT
PUGET SOUND
SCALE IN FEET
CHLORINE CONTACT CHANNEL (IF REQUIRED)
OXIDATION TANKS
SULFONATION BUILDING (IF REQUIRED)
DIGESTERS
FILTER PRESS BLDG
CRYOGENIC OXYGEN PLANT
SECONDARY CLARIFIERS
MAINTENANCE BLDG ADDITION
W.A.S. THICKENER
ADMINISTRATION BLDG ADDITION

Figure 3-10

Alternative F
West Point Layout

Impacts

The direct impacts projected under this alternative through the year 2005 are described below. Secondary impacts are discussed in the Regional EIS which is Volume I of this series.

Geology, Soils and Topography

Alternative F requires expansion of the West Point facility, but no shoreline fill. The installation of oxygen activated sludge facilities for secondary wastewater treatment would require a total of 42.1 acres. Some construction may be at the base of the unstable bluffs bordering the site to the east. Building at the base of the bluff could have potentially major adverse effects from landslides. With retaining walls or upland drainage and fill at the toe of the slope, the site would probably be sufficiently stable to permit construction at the base. The effect is judged to be minor as mitigated, limited in extent and a long-term problem.

Earthquake damage is considered to be potential for low structures such as those planned. These would be susceptible to damage primarily from differential settlement of soils caused by ground shaking. It is assumed that structures would be designed to withstand such events, but damage could still occur.

Erosion and deposition during construction could be major but limited in extent, reversible, of short duration, and quite possible in the rainy climate of Seattle. The magnitude of the effect depends on the duration of the construction period.

Any effects on shoreline sediment transport due to the sludge lagoon would continue. Existing information is not sufficient to evaluate the impacts at this time, however. The Carkeek-West Point interceptor constructed along the shore of Puget Sound from Meadow Point across Salmon Bay would alter shoreline sediment and topography and increase erosion and siltation and disturb benthic sediments. The impact is expected to be severe, but limited in extent, temporary and reversible.

Air Quality and Odors

Upgrading the West Point plant to secondary treatment would increase the potential for odors escaping into the surrounding area. Because secondary treatment plants are larger and more complex than primary plants, expose more water surface area to the air and subject the water to more perturbation, there is a greater likelihood for odors being released into the surrounding neighborhood from secondary treatment plants.

Various practical measures can be employed, however, to control treatment plant odors and are discussed in the section on mitigation measures. The odor problems at West Point would still be minor, of limited extent and intermittent. Dust from construction could be a major, short-term problem. Particulates and engine emissions would increase along the shoreline affected by construction of the Carkeek-West Point interceptor. The effect would be minor, temporary and reversible.

Emissions from increased sludge truck trips and employee vehicle traffic are considered to be minor, limited in extent and of short duration due to the good air circulation on and near the site. Odors due to CSO's would be reduced by control of CSO's.

Water Quality

In Alternative F, secondary effluent would be discharged from West Point. Flows to West Point would be reduced about 28%, suspended solids discharged 82% and BOD 87%. The increased efficiency of solids removal could potentially substantially improve the microbiological quality of the effluent if disinfection practices are improved. Discharges of heavy metals, PCB's and pesticides will decrease if these are associated with particulates. There would be 21% CSO control overall (15% decrease to Elliott Bay, 31% to Ship Canal; see Table 3-9) over B levels.

Puget Sound. Nutrients loads from West Point effluent would decrease 28%, and from CSO's about 15% (Elliott Bay) from B levels. The probable benefit is considered to be minor, long-term, limited in extent and reversible. Solids and BOD loads would be reduced about 82 to 87% in effluent, 15% in CSO's from baseline (B) levels, for a general minor-to-moderate long-term benefit to water quality. Metals and

TABLE 3-9

Annual CSO Pollutant Load Reduction-Alternative F

Water Body Location	Baseline Alternative B			Alternative F		
	Volume (mil gal)	BOD (tons)	Solids (tons)	Volume (mil gal)	BOD (tons)	Solids (tons)
* Green Lake	-	-	-	-	-	-
* Lake Washington	22.4	5.58	20.4	15.4	3.83	14.0
* Portage Bay/Montlake Cut	228	59.3	241	188.8	40.7	166
* Lake Union	56.6	14.1	51.4	38.9	9.68	35.3
* Ship Canal/Salmon Bay	254	63.3	231	175	43.5	158
* Elliott Bay	358	89	325	304	76	275
Duwamish River	251	62	227	256	63.7	232
Puget Sound (Alki)	5.46	1.36	4.95	0.15	0.04	0.14
TOTAL	1175.46	294.64	1100.75	978	237	880
Approximate Overall Percent Reduction	0			17	20	20
* To West Point Service Area	0			21	24	25

Source: Metropolitan Engineers, 1977.

toxicants attached to solids would decrease proportionately.

With respect to microbiological quality, waters near combined sewer overflows would continue to be adversely affected. Whether or not state fecal coliform standards would be met is unknown, but doubtful with only a 15% CSO reduction. At West Point, secondary treatment would allow for improved kill with less chlorine as disinfection practices are improved through use of a chlorine contact tank. Dechlorination would eliminate potential effluent toxicity.

Heavy metals removal efficiencies would be substantially higher than for enhanced primary treatment, but metals would still be released to the Sound from remaining CSO's and other sources not controllable by Metro wastewater facilities. For toxic compounds, improvements from secondary treatment would be accompanied by continuing CSO's. The overall benefit effect would be minor, because metals concentrations are not excessively high in effluent; limited in extent; long-term, because the discharge of toxic materials would continue through the planning period; and irreversible because of the non-degradable nature of the contaminants. Although the contribution of PCB's from the Duwamish area is expected to diminish in 1978-1979 with enforcement of the Toxic Substances Act, PCB's already accumulated in Duwamish sediments will continue to exert adverse effects for a long time.

The construction of the Carkeek-West Point interceptor could cause some localized, temporary turbidity along its route.

Lake Washington. CSO's to the lake would be reduced 31% over B levels. The probable benefit to water quality along shore is considered to be minor but long-term. Benefits to offshore waters would probably be very minor-to-negligible. Effects of F on microbiological quality are unknown, but it is possible that occasional health risks with respect to bathing could be reduced.

Lake Union/Ship Canal. CSO's would be reduced 31% over B levels to this water system. As overflows constitute a relatively larger portion of these than of Lake Washington waters, the reduction could be considered a minor-to-moderate, or larger, benefit to water quality than above.

Groundwater. Groundwater levels could have a minor, limited but long-term negative impact if dewatering is necessary at the construction site.

Biology

Under Alternative F, West Point effluent would receive secondary treatment. Carkeek Park would become a wet weather facility with dry weather flows transferred to West Point through a new interceptor. Overflows to freshwaters would be reduced about 31% below baseline (B) levels. Overflows to Elliot Bay would be reduced 15%.

No shoreline fill would be required as expansion would be to the area northeast of the present facility.

Terrestrial habitats. Construction in the meadow could eliminate that habitat. In addition, construction at the base of the unstable cliffs adjacent to the site could threaten birds nesting in the cliffs. The impacts are considered to be adverse and moderate-to-major in severity, but highly limited in extent. The effects are probably reversible but could be of long duration if the plants and animals affected recolonize slowly.

Shoreline habitats. CSO pollutants loads to Lake Washington and to Union Bay/Portage Bay marshes would be reduced by a minor-to-moderate amount (31%) from baseline (B) levels (Metropolitan Engineers, 1977).

With the reductions, loads and flows would be essentially at present levels. The benefit relative to baseline (B) is considered to be minor-to-moderate, fairly extensive in these waters, and long term as CSO's continue and metals and toxicants loads would decrease.

The intertidal. Overflows to Puget Sound would be reduced - 15% to Elliot Bay. Effluent flows from West Point would decrease by a minor-to-moderate amount (28%) but BOD and solids loads would decrease 87% and 82% respectively. Carkeek would be a wet weather plant by 1985. An interceptor would connect the facility to West Point.

As effluent from the West Point outfall comes onshore occasionally, a major reduction in loads from baseline levels due to secondary treatment would be a benefit to the intertidal. It is recognized that effluent has been found only on one occasion at West Point, but it is likely that this is a recurring phenomenon. The total effluent load to the intertidal is unknown.

The reduction in overflows to the intertidal is judged to be a minor benefit, limited in extent along the beaches, but of long duration for solids, BOD, nutrients, metals, and toxicants.

Overall, nutrient loads, from CSO's and effluents which appear to have the most discernible effect on the intertidal, would be reduced. Effects at West Point, where nutrients would decrease 28% from B, would be minor. Further changes in the diversity and abundance of intertidal plants and animals would probably continue however as the pattern of natural succession may have been affected by effluent and other factors.

CSO control could reduce the fecal coliform bacterial levels in shoreline waters. State standards for shellfish waters might or might not be met and potential helth risks to shellfish consumers be reduced. With the installation of chlorine contact facilities, disinfection could be optimized with half the chlorine. Dechlorination would eliminate effluent toxicity due to chlorine residuals.

At the same time, Alternative F includes a Carkeek-West Point interceptor along the shore of Puget Sound and crossing Salmon Bay, the impacts of whose construction on intertidal and shoreline habitats are expected to be major and adverse, but highly limited in extent, temporary, and reversible. The substrate would be removed and much turbidity generated, locally destroying benthic communities and reducing light levels for a limited period.

Puget Sound. As in the intertidal, the loads of BOD, solids, metals and toxicants to nearshore and offshore waters would be reduced.

Offshore phytoplankton would probably continue to be affected by the lower level of nutrients.

Coliform bacteria levels in waters could decrease, reducing health risk from consuming shellfish. Bacterial and virus inputs to Puget Sound from overflows would also be decreased. Whether strict state fecal coliform standards would subsequently be met cannot be determined at this time.

The apparent influence of the West Point effluent plume on benthic community composition would probably be continued at West Point with flows continuing at present levels. Effects of nutrients would be somewhat reduced (28% decrease) as these are not removed significantly by secondary treatment. Solids and BOD loads, however, would be substantially (87%

and 82%) decreased so the roles of these parameters in maintaining observed patterns in animal distribution and abundance could also be reduced.

The composition of fish assemblages near the outfalls may or may not change with secondary treatment of effluents as the attractions for particular species to the outfalls have not been identified.

The slightly elevated incidence of tumorous flatfish at West Point may or may not change with secondary treatment of effluent, as the cause(s) of the phenomenon is unknown.

The Carkeek-West Point interceptor would cross Salmon Bay, which is critical for migratory fish species of the Lake Washington drainage basin and supports many of the marine species found in the Seattle area. The bay is also a resting and feeding area for migratory water birds. Alterations in the water quality due to laying of the pipe could increase migratory fish susceptibility to natural mortality and predation for the period of construction. Timing construction to minimize the effect would be difficult as at any given time of year, there are migrations upstream or downstream by some salmonid species.

Commercial and sport fisheries. Salmonid runs up the Ship Canal and through Lake Washington would experience reductions in overflow BOD and solids loads and flows. Impacts of these and other inputs, such as turbidity, nutrients, metals and toxicants would be 31% lower than Alternative B baseline levels.

Juvenile fishes including salmonids and bottom fish feeding inshore in areas occasionally affected by effluents, would probably benefit from the decrease in toxicants, and metals loadings which otherwise could accumulate in their prey. The beneficial impact could be minor-to-moderate, limited in the central Sound and long term as effluent discharge continues.

The construction of the Carkeek-West Point interceptor could disrupt fish migration and freshwater-salt-water transition areas in Salmon Bay through excavation of the bottom, physical obstacles, noise, turbidity, and possibly resuspension of toxic elements in the sediment. The result could be increased fish mortality and predation. The adverse impact is considered to be severe, but limited in extent, of short duration and reversible.

Freshwater environments. Alternative F provides about 31% CSO control to freshwaters.

1. Lake Washington. CSO reduction would be minor-to-moderate; 31% lower than Alternative B levels by 2005. Moderate limited negative impacts would continue in water along the western shore. Minor impacts could occur in off-shore waters, as overflows tend to move along shore rather than into deeper waters immediately. Lake shore and shallows biota would continue to be exposed to BOD, solids, sediments, nutrients, metals, toxicants, pesticides, oil and grease and pathogens.

2. Green Lake. The effect on the lake of continued negligible overflows would probably be almost undetectable, as other inputs dominate the environmental conditions of this eutrophic, poorly-flushed lake. Waterfowl and stocked trout would probably not be affected.

3. Lake Union/Ship Canal. CSO flows and loads would be about 31% lower than in B in 2005. The stress on the biota of these waters could be essentially unchanged as the overall effect of CSO's relative to other inputs is unknown.

Rare and endangered species and sensitive habitats. No listed species are recorded from the study area. Locally rare plant species in the meadow north of the West Point facility (described in Chapter II of this report) would be removed. The meadow area is considered to support a plant community unique to West Point and the north beach of Discovery Park and which has been used in Park programs. Pidgeon guillemots nest in the cliffs adjacent to the existing sludge lagoon and would not be affected by expansion of the West Point facility into the meadow area to the northeast.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative F would have the following impacts on the human environment.

Land use. Fill is not required in this alternative as oxygen activated sludge is used rather than air activated sludge.

This alternative allows optional development of the south beach for public use and a large area to the northeast for possible park use. The undeveloped area in the north beach could be developed as a marsh habitat. These are optional features whose costs are not included in facilities planning costs.

Agency goals. Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether expansion of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would "provide an open space of quiet and tranquility for the citizens of Seattle"; and whether this facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice."

Employment and costs. Employment and cost impacts are analyzed in the Regional EIS.

Social, recreational and cultural. The south beach and an undeveloped area northeast of the facility could be accessible to the public. This impact is favorable, minor, long-term, local, reversible and definite. It is questioned however, how popular a beach would be adjacent to a wastewater treatment facility.

This alternative complies with the wish of 60% of the 377 randomly selected Magnolia area people polled that secondary treatment be implemented. This impact is considered favorable, major, long-term, reversible, and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by former construction. No historical sites are in the affected area.

Health and safety. There may be fewer health risks associated with the consumption of shellfish due to the discharge of secondary effluent rather than primary, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction safety risk would be as for any other similar construction: with safety conscious procedures, there should be a slight chance of accidents.

With the oxygen activated sludge method of secondary treatment, oxygen is mixed into the activated sludge basin for the respiratory functions of the microorganisms which digest sewage. If this oxygen comes in contact with hydrocarbons (e.g. gasoline) in the presence of a spark, there could be an explosion. However, this situation should never arise. Oxygen activated sludge facilities are designed to provide continuous monitoring of hydrocarbon concentrations. An alarm will sound far below dangerous hydrocarbon levels, and oxygen would automatically be vented to bypass the activated sludge basin. The impact of an explosion could be adverse, major, long-term, reversible, but would be highly unlikely. Although oxygen activated sludge facilities are used around the country, there have not yet been any incidences of explosion.

Aesthetics and nuisance. The West Point wastewater treatment facility expansion would be well-designed for consideration of aesthetics. It would lie low, be clean, and surrounded by well-kept grass and screening trees. Few odor complaints have been filed, but odors may increase with secondary treatment. Visibility of the West Point facility from Discovery Park would be blocked by bluffs. Only 10% of these 377 Magnolia residents interviewed by Gerhardt Research were opposed to the location of the West Point facility. Although more were opposed to expansion, it was cautiously accepted as a "necessary evil".

The additional oxygen activated sludge basins have been placed such that they are not visible from behind the bluffs at Discovery Park.

These aesthetic impacts would be adverse, minor, long-term, local, reversible and definite.

The noise and traffic of sludge trucking is a minor nuisance which did not seem to bother many people. Some people were unaware of which route the trucks traveled (HRPI, 1976). The sludge traffic is expected to approximately double under this alternative.

CSO's will be dealt with in the Regional EIS and in the water quality section of this EIS.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative meets the requirements of PL 92-500.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, this facility would occasionally receive slugs of cadmium, mercury and arsenic. At Carkeek, identification of grease and metal sources and perhaps pretreatment or changes in discharge permits could reduce levels of these parameters to influent.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

Figure 3-11 indicates landscaping measures which could be taken to improve the aesthetics and recreational value of the West Point site under this alternative.

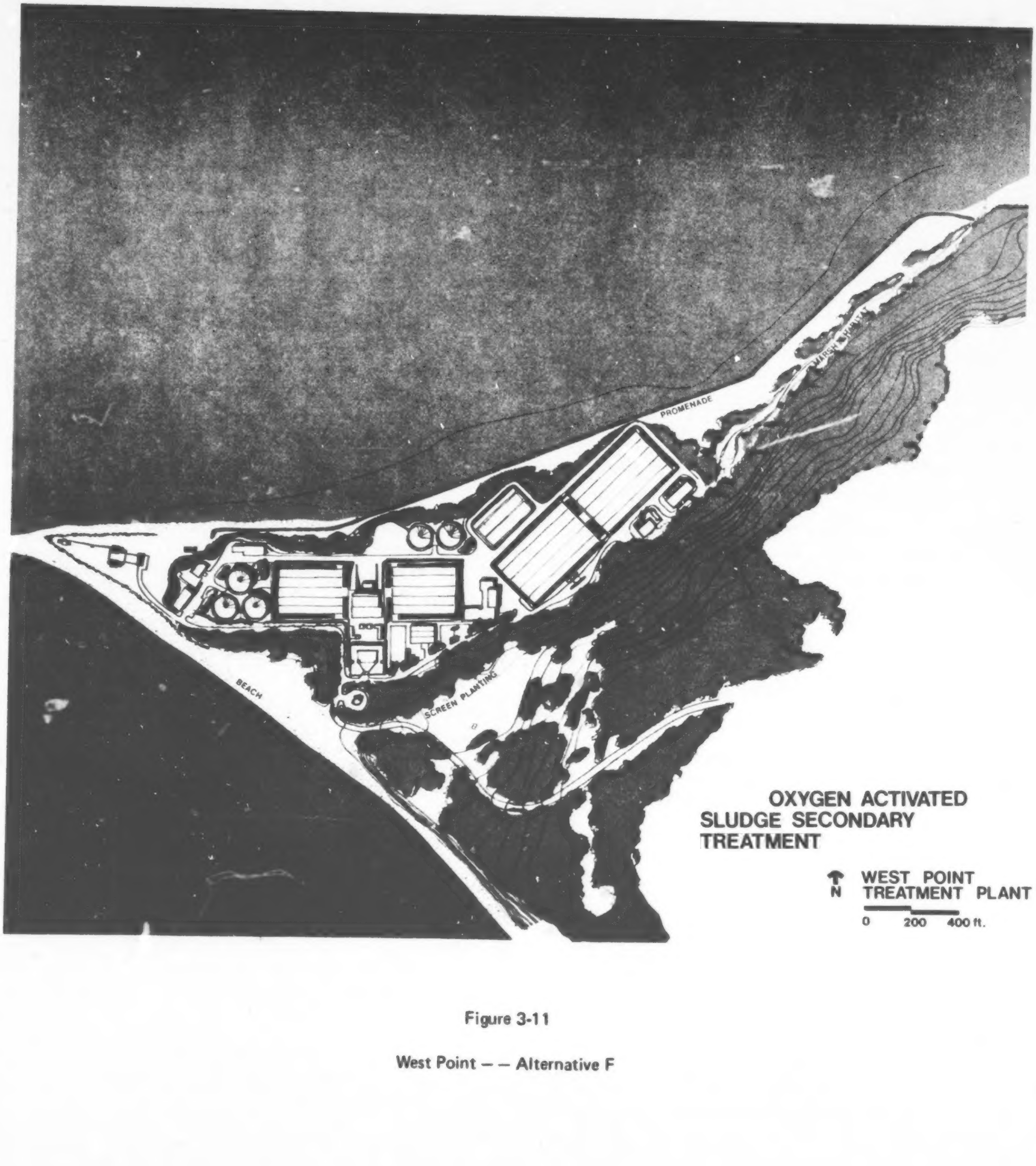

PROMENADE
MARSH SHORE
BEACH
SCREEN PLANTING
OXYGEN ACTIVATED
SLUDGE SECONDARY
TREATMENT
N
WEST POINT
TREATMENT PLANT
0 200 400 ft.

Figure 3-11

West Point -- Alternative F

Alternatives and Impacts
Alternative F

This alternative allows development of the south beach for public use, removal of the sludge lagoon, and a large area to the northeast for possible park use. The undeveloped area in the north beach could be developed as a marsh habitat. Removal of the sludge lagoon would eliminate any effects of that structure on longshore sediment transport.

Berms and native landscaping could be utilized to screen the plant and create a natural edge. Retaining walls should support berms and/or terracing in tight locations such as the clarifier tanks against the seawall. Sludge truck traffic, if required, would be held between the plant and the bluffs.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Combined sewer overflows. This alternative does not take adequate measures to control CSO's; they will still occur in wet weather.

Land use. Land is required in all alternatives; the question is: where will the impact occur.

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest.

O & M and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

Secondary effluent effect on water quality and biota. Nutrient inputs to Puget Sound would continue at baseline levels: remaining solids, BOD and other loadings would continue to exert some effect on water quality.

ALTERNATIVE G
SECONDARY/WEST POINT PHASEOUT OPTION

Alternative G provides an option for phaseout of West Point by construction of a new secondary treatment plant in the Interbay area. Of the two alternative sites evaluated incorporating public input, the Golf Park site has been shown in the system layouts and costs. West Point would be used as an intermittent wet weather treatment facility during the planning period and phased out only if large flow reductions were made.

Service Areas

The present service area of West Point would be reduced in size and dry weather flows routed to Interbay.

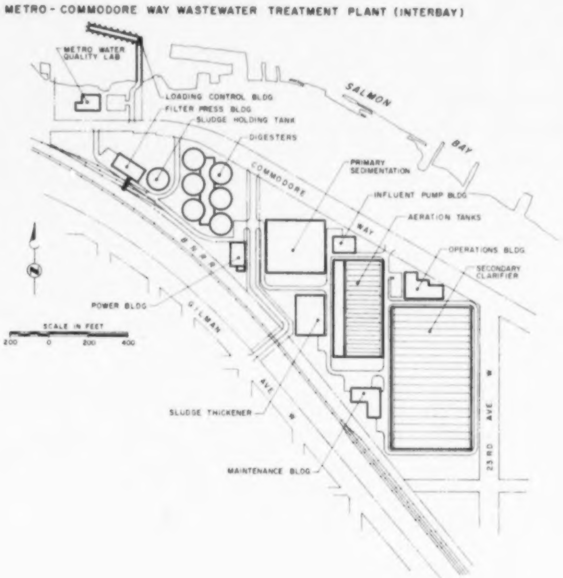
The Interbay service area would remain the same as for West Point in Alternatives B and E (Figure 3-1). North Lake Sammamish would be transferred to Renton via the Redmond connection. Val Vue would be transferred to Interbay. To serve increased north Lake Washington flows would require construction of the Kenmore parallel interceptor. The Carkeek Park area would also be served by Interbay in dry weather via the Carkeek-West Point interceptor. Carkeek could be abandoned in 1995.

Treatment Plant

The new Interbay plant would provide secondary treatment for 150 mgd average, 200 mgd peak flows beginning in 1985. West Point would be converted to a wet weather plant only, providing primary treatment to 350 mgd peak flows. The West Point site would appear as in Alternative A.

The proposed Interbay site is the Golf Park. Due to public controversy on the optional Commodore Way site, both sites are evaluated in this EIS. Layouts are shown in Figure 3-12.

Effluent from the Interbay plant would meet 30 mg/l BOD, 30 mg/l solids standards. Primary treatment of storm-


METRO - COMMODORE WAY WASTEWATER TREATMENT PLANT (INTERBAY)
METRO WATER QUALITY LAB
LOADING CONTROL BLDG
FILTER PRESS BLDG
SLUDGE HOLDING TANK
DIGESTERS
SALMON
BAY
PRIMARY SEDIMENTATION
COMMODORE
WAY
INFLUENT PUMP BLDG
AERATION TANKS
OPERATIONS BLDG
SECONDARY CLARIFIER
POWER BLDG
SCALE IN FEET
200
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GILMAN
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SLUDGE THICKENER
MAINTENANCE BLDG
23RD AVE W

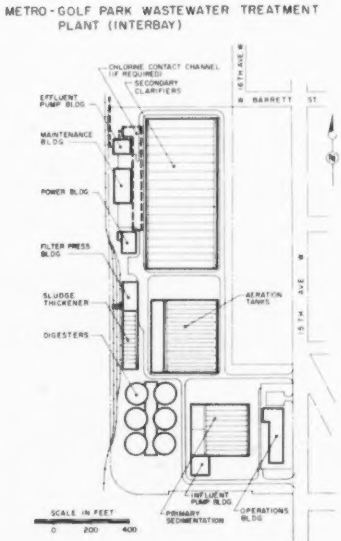
METRO - GOLF PARK WASTEWATER TREATMENT PLANT (INTERBAY)
CHLORINE CONTACT CHANNEL (IF REQUIRED)
SECONDARY CLARIFIERS
16TH AVE W
W BARRETT ST
EFFLUENT PUMP BLDG
MAINTENANCE BLDG
POWER BLDG
FILTER PRESS BLDG
SLUDGE THICKENER
DIGESTERS
AERATION TANKS
15TH AVE W
INFLUENT PUMP BLDG
PRIMARY SEDIMENTATION
OPERATIONS BLDG
SCALE IN FEET
0
200
400

Figure 3-12
Interbay Layouts

water at West Point would produce unknown effluent quality. Chlorine contact channels and dechlorination facilities would be constructed.

Wet weather flows from West Point and dry weather flows from Interbay would be discharged to Puget Sound through the existing West Point outfall. Wet weather flow from Interbay would be discharged through a new outfall to Elliott Bay. As an option, Interbay flows might be used for summer lock flushing in the Ship Canal.

Combined Sewer Overflows

CSO's to Lake Washington, Lake Union, Ship Canal, Portage Bay and Elliott Bay would be approximately as in Alternative B due to wet weather treatment at West Point. However, due to growth in the service areas, CSO's would increase slightly over existing conditions.

Sludge

West Point wet weather sludge would be stored in digesters during storms, then transferred to Interbay for digestion where anaerobic digestion would be provided. Dewatered Interbay, West Point and Richmond Beach sludge would be trucked to Cedar Hills landfill for disposal or to Pack Forest for recycling research.

Impacts

The direct impacts projected under this alternative through the year 2005 are described below. Secondary impacts are discussed in the Regional EIS which is Volume I of this series.

Geology, Soils and Topography

Alternative G calls for conversion of West Point to a wet weather plant, with a new plant at Commodore Way or the Golf Park. No shoreline fill would be required. Alternative G also includes construction of the Kenmore parallel and a Carkeek-Interbay interceptor.

At West Point, no impacts are expected as there would be no construction. Earthquake damage potential would continue at present levels, which are considered to be minor, limited in extent and of short duration.

A treatment plant at Commodore Way would be on clay soils well suited for construction, although drainage would need to be provided to prevent water accumulation in the deep foundation excavations. Low buildings such as proposed in these hard soils could experience moderate amplification of long period vibrations and greatest amplification of short period vibrations. The Golf Park site would be on fill, which is unstable, and subject to substantial seismic hazard of differential settlement.

Erosion and deposition during construction could be major, but limited and short-term problems. Changes in topography and soil profile would be minor -- beneficial in the long run at West Point, and negligible at Commodore Way and negative but minor at the Golf Park. The overall effect is judged to be minor, limited, long-term and negative.

Any effects on shoreline sediment transport, erosion and deposition due to the sludge lagoon would continue. Information is not sufficient at this time to evaluate the effects, however.

The construction of the Kenmore parallel interceptor would temporarily alter lake bottom and shoreline soil profiles and topography and increase nearshore erosion and siltation, as discussed in the Regional EIS.

The Carkeek-West Point interceptor would be laid in the West Point service area from south of Meadow Point south along shore and finally across Salmon Bay. Construction would temporarily alter shoreline sediment and topography and increase nearshore erosion and siltation. The benthic sediment of Salmon Bay would be disturbed. The highly probable impact is judged to be severe but limited in extent, of short duration and reversible.

The construction of the Interbay outfall to Elliott Bay would cause major but highly limited and probably temporary disruption of benthic sediments.

Air Quality and Odors

Conversion of the West Point plant to a wet weather only facility in 1985 would substantially reduce the potential for odor problems in this area. The operation of a new secondary treatment plant at Interbay, an area of poor air circulation, would create a potential for odor problems in this area. Because secondary treatment plants are larger and more complex than primary plants, expose more water surface area to the air and subject the water to more perturbation, there is a greater likelihood for odors being released into the surrounding neighborhood from secondary treatment plants.

Various practical measures can be employed, however, to control treatment plant odors and are discussed in the section on mitigation measures.

The proposed facility would not add significantly to the air pollution load already present, but the impact of odors on the Interbay business community could be moderate, because of the lack of a buffer zone; intermittent, but continuing; and reversible.

The Golf Park lies over a sanitary landfill many decades old. Excavation required to build on this site would cause major and extensive odor problems of short duration. Gases released would probably include hydrogen sulfide and methane. Health hazard would be mitigated by odor control methods during construction, but the odors would not be entirely contained.

Minor CSO control near West Point would reduce odors from that source somewhat.

Construction of the Kenmore parallel interceptor and the Carkeek-West Point interceptor would result in localized minor increases in particulates and engine emissions. The impacts are expected to be short-term and reversible.

Construction of the Interbay outfall to Elliott Bay would locally increase particulates and engine emissions in the Terminal 91 area.

Water Quality

Alternative G includes conversion of West Point to a wet weather plant with a possiblity of long-term phaseout dependent on CSO controls. A new secondary plant at Interbay would discharge secondary dry weather effluent into Puget Sound through the West Point outfall, to Elliott Bay in wet weather, or to the Ship Canal in summer for lockage on an optional basis.

The volume and loads of CSO's would be essentially as in baseline conditions (3% increase).

Puget Sound. The volume of effluent discharged off West Point would not increase relative to the baseline alternative, but suspended solids would be reduced 72% and BOD 80%. The increased efficiency of solids removal could potentially improve the microbiological quality of the effluent. The discharge of heavy metals, PCB's and pesticides will decrease if these are associated with particulates. There would be no effect on Puget Sound temperature, salinity, dissolved oxygen, or BOD.

Very minor reductions in nutrients from secondary treatment would be offset by essentially the same contributions from CSO's. The overall adverse impact at West Point would continue to be moderate; long-term, because the increased discharge would continue through the planning period; limited to waters near West Point; and reversible. Suspended solids loads at West Point would be reduced due to secondary treatment, but CSO's would increase by a negligible amount. The positive impact would be minor, because the solids load of receiving waters would not be greatly decreased; limited in extent; long-term, because the discharge of solids would continue through the planning period; and reversible. CSO's would continue to degrade microbiological quality, but as CSO's are relatively small near West Point, the overall adverse impact is judged to be minor, limited in extent, long-term and reversible.

Heavy metals removal efficiencies would be substantially higher than for enhanced primary treatment, but metals would still be released to the Sound from CSO's and other sources not controllable by Metro wastewater facilities. For toxic compounds, there would be some improvements from secondary treatment, although CSO's would continue. The overall positive effect would be minor, because metals concentrations would not be excessively high; limited in extent; long-term, because the discharge of toxic materials would continue through the planning period; and irreversible because of the non-degradable nature of the contaminants.

Although the contribution of PCB's from the Duwamish area is expected to begin to diminish in 1978-1979 with enforcement of the Toxic Substances Act, PCB's already accumulated in Duwamish sediments will continue to exert adverse effects for some time.

The new outfall to Elliott Bay from the Interbay plant would discharge as much as 200 mgd (309 cfs) of secondary treated wet weather effluent through a 72-inch pipe with a diffuser section extending 1200 feet offshore. Average discharge depth would be 50 feet, and effluent quality is expected to be 20 mg/l each BOD and suspended solids, and 200 MPN/100 ml total coliforms (Metropolitan Engineers, 1977).

Because of the expected flow rates and shallow discharge depth, the effluent is expected to surface. The resulting "boil" may or may not be visible, depending on its color and turbidity relative to those of the receiving waters. Elliott Bay tends to be turbid, especially in wet weather due to the silt load in the Duwamish outflow.

The stated design initial dilution is 100:1. The length of the diffuser necessary to achieve this dilution with expected flows and discharge depth (neglecting currents) would, however, probably exceed the specifiec outfall length. The writers conclude, therefore that it would be difficult to achieve the desired effluent dilution.

Net circulation in the receiving waters is along shore towards West Point, driven by outflow from the Duwamish, rather than out into offshore waters of the bay. Tidal currents appear not to be as strong as at West Point and the bay is not well-flushed.

The effect of the effluent plume on water quality along the shore of Elliott Bay from the discharge point to West Point cannot be determined as information is presently insufficient. Potential effects could be from total or fecal coliforms, total residual chlorine, turbidity, and nutrients. There is limited information on the present condition of the waters and sediments. The plume could add new loadings of BOD and solids.

The construction of the Carkeek-West Point interceptor could cause temporarily increased turbidity in nearshore waters of Puget Sound.

Lake Washington. The construction of the Kenmore parallel interceptor in the West Point service area along the northwest shore of Lake Washington would affect the lake's water quality in the form of increased turbidity and perhaps resuspension of metals and other materials associated with lake sediment. The effect is described in more detail in the Regional EIS. The probable adverse effect on water quality is considered to be moderate but highly limited in extent in the lake, of short duration and reversible as particles resettle.

Ship Canal. The discharge of 145 mgd of secondary effluent to the Ship Canal to control salt water intrusion could moderately impair canal water quality. A more detailed discussion is included in the Regional EIS.

Groundwater. Effects of groundwater levels on construction would be reduced as dewatering would not be required at either Interbay site.

Biology

Alternative G would convert West Point to a wet weather plant, with a new secondary plant at Interbay or Commodore Way. Effluent from the new plant would discharge through the existing West Point outfall most of the year. The new plant would discharge through a new Elliott Bay outfall in wet weather. The effluent is also being considered for use as lockage in summer.

Several elements of Alternative G could affect the biology of the study area. CSO flows and loads to freshwaters in 2005 would occur at essentially the same levels (3% difference) as in baseline Alternative B. Overflows to Elliott Bay beaches would continue at baseline levels, and the bay would receive up to 200 mgd of secondary treated wet weather effluent. A Kenmore parallel interceptor would be built along 4,000 feet of Lake Washington's northwest shore, and a Carkeek-West Point interceptor along the connecting shore of Puget Sound. Effluent flows at West Point would be aproximately as in baseline levels (B), but solids and BOD loads would be significantly reduced (72 and 80%) over baseline (Alternative B) levels.

Terrestrial habitats. Eventual optional phaseout of the West Point treatment facility would allow the present site to return to more natural conditions suitable for wildlife and vegetation. The benefit would be minor-to-moderate, limited in extent but of long duration. A minor negative impact would occur temporarily when the existing structures are removed due to noise and dust from demolition.

Impacts on wildlife and vegetation from construction of a treatment facility and outfall at either the Commodore Way or the Golf Park site would be very minor as these are in commercial-industrial areas which support little plant or animal life.

While the exact route of the Kenmore parallel interceptor is undecided, it is certain that some temporary minor disturbance of terrestrial habitats would occur due to noise and physical disturbance due to construction activities. The impact is expected to be minor, but extending 4,000 feet along the northwestern shore of Lake Washington. The effects would be short-term (for the duration of construction plus a short time afterwards) and reversible as the plants and animals could recolonize the area once construction is completed.

Shoreline habitats. Sewer overflows to marshes in Lake Washington and the Ship Canal would be essentially the same as for baseline Alternative B. The impacts of G are therefore considered to be negligible relative to baseline conditions for overflows.

The construction of the Kenmore parallel interceptor would involve excavation, causing local increases in turbidity and limited destruction of shoreline habitat along the northwest shore of Lake Washington. The noise and vibration would frighten away fish and shoreline birds, mammals and other vertebrates for the duration of construction. Salmon spawning areas could be possibly silted over and turbidity would reduce light levels available for plants. The adverse impact of the construction is judged to be severe, but highly temporary, limited in extent and reversible. Mitigation measures are discussed in a subsequent section.

The intertidal. The Puget Sound intertidal would receive overflows at baseline (B) levels. Treatment plant effluent flows and nutrient inputs at West Point would remain at baseline (B) levels, but solids and BOD loads would be reduced 72% and 80% respectively below baseline levels.

West Point treatment plant effluent reaches shore on occasion. The intertidal at West Point would continue to be affected by nutrients (nitrates), which could maintain what appears to be an overenrichment situation affecting intertidal algae and grazers on them. The impact is considered to be adverse as plant diversity appears to have decreased; moderate in size as the increase in effluent nutrients is moderate, limited in extent to beaches adjacent to the outfalls, long-term where flows continue through the planning period, and reversible.

Improved metals removal with secondary treatment of effluents could possibly result in a decrease in metals levels in intertidal clams and algae at West Point. As metals levels in biota meet standards for mercury (Hg) and lead (Pb), the decrease is judged to be a minor but long-term benefit to the beaches adjacent to the outfalls.

Pathogens would continue to reach the intertidal through overflows at baseline levels although their numbers could be reduced in effluents. Whether or not state fecal coliform bacterial standards for shellfish waters would then be met cannot be determined as the sources of bacteria and their relative contributions have not been identified.

Alternative G also includes a Carkeek-West Point interceptor along the shore of Puget Sound and crossing Salmon Bay. Assuming the line would be underground, the disruption of the shoreline and/or intertidal habitats would be major but temporary and limited. The substrate could be removed and much turbidity generated, similar to the effects of the Kenmore parallel on lake shores.

Puget Sound. Effluent flows would remain at baseline levels relative to B at West Point. Total flows to the Sound would be as at baseline levels, however. As solids and BOD loads would be significantly reduced (80% and 72%), metals and toxicants would also be reduced by an undetermined amount. Nutrient removals would be insignificant.

The transfer of Carkeek flows to the West Point outfall (after treatment at Golf Park or Commodore Way), increasing flows at that point by an insignificant amount (3%) would probably have a negligible effect on the increased algal productivity extremes observed within a mile of the outfall. The effect is considered to be adverse, negligible-to-minor, limited in extent to the vicinity of the outfall, of long duration as flows continue, and reversible.

The apparent effects of effluent plumes on the abundance and distribution of benthic organisms seen at West Point would continue. At West Point, any effects due to solids and BOD would probably decrease; effects due to nutrient inputs could increase. Dechlorination and chlorine contact facilities would eliminate effluent toxicity potential.

Free-swimming life could continue to be abundant near the outfalls and their plume dispersion areas. Fish could continue to congregate near outfalls, attracted by the pipe itself, by the life attached to it and/or by the effluent or the effects it has on benthic prey species. The incidence of tumors in flatfish at West Point may or may not be affected as the causal factors have not been identified. Fish would, however, be exposed to lower levels of metals and toxicants. This is considered to be a benefit though minor.

Alternative G includes a new outfall from the Interbay secondary facility through which up to 200 mgd of secondary treated wet weather effluent would be discharged at a depth of 50 feet some 1200 feet offshore.

Before dilution the effluent is expected to contain 20 mg/l each BOD and solids and 200 MPN total Coliforms/100 ml.

Because of the expected flow rates and shallow discharge depth, the desired initial dilution would probably not be attained, and the effluent would tend to surface. Thus nearshore and intertidal organisms along the shore of Elliott Bay and perhaps West Point South Beach (due to circulation patterns in the bay) could be exposed to increased coliforms, chlorine residuals, solids, and other parameters to an unknown degree and with unknown frequency.

Commercial and sport fisheries. CSO's would continue at baseline levels along the migratory fish run: Ship Canal-Lake Washington. Similarly, CSO's to Elliott Bay would continue at baseline levels, but up to 200 mgd of chlorinated secondary wet weather effluent would be discharged from Interbay. Chlorinated secondary effluent could also be discharged to Ship Canal for lockage in summer from the Golf Park or Commodore Way plant. The added nutrients in the low DO, chlorinated wastewater, would probably have major adverse effects on migratory (and other) fish species already stressed by degraded water quality in the Ship Canal and in Elliott Bay. Discharge to Shilshole Bay would not be a great improvement, as that water is not well mixed either.

Insofar as West Point effluent affects nearshore commercial and sport fish at some stage in their lives, secondary treatment, in removing solids, metals and toxicants would provide a benefit. This effect is judged to be minor-to-moderate, somewhat limited in extent in the Central Sound, and long-term.

The Carkeek-West Point interceptor would have a significant but limited and short-term adverse impact on salmonid migration during its construction through Salmon Bay. Construction timing could theoretically mitigate this impact, but at any given time of year some salmonid species is migrating upstream or downstream.

Construction of the Kenmore parallel interceptor could possibly silt over salmon spawning areas along the northwest shore of Lake Washington if construction is not limited to the months of April through September. Further studies of possible environmental impacts would be conducted before construction.

Freshwater environments. The impacts on these waters as in previous alternatives are primarily a function of overflow control. Under Alternative G, there would be no change over baseline levels.

1. Lake Washington. Organisms would continue to be affected by baseline levels of oil, grease, nutrients, pathogens, solids, metals and toxicants along the western lake shore. The effects on biota of the construction of the Kenmore parallel interceptor have been discussed previously.

2. Green Lake. With no change in overflow levels from baseline, impacts of Alternative G on the biota of this eutrophic lake would be negligible.

3. Lake Union/Ship Canal. CSO's would not be reduced, and up to 145 mgd of secondary effluent could be discharged to this water in summer for lockage. The effluent would have to be chlorinated to protect public health. As discussed previously, the overall effect would be adverse and major, as the chlorinated effluent would probably be toxic, contain low levels of DO and substantial nutrient loads. The existing stress on biota would probably be significantly

aggravated and increased fish mortality could result, which could be an extensive and long-term impact on the size of fish populations.

Rare and endangered species. No impacts are expected as no listed species are recorded from the study area. Sensitive habitats have been discussed previously. Unique plants and pigeon guillemots would not be affected, as there would be no expansion at West Point.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Under Alternative G the same impacts as occur under Alternative A would continue at West Point. In addition, impacts would occur at the Interbay site.

Land use. There would be no change in land use since in Alternative G, there is no construction at West Point.

The presence of the West Point wastewater facility would continue to conflict in part with the natural setting of the park.

In the Interbay region, many sites have been considered; two have been looked at in detail for Alternative G: the Commodore Way and the Golf Park sites. The site at Commodore Way has already been developed as a distinct business district predominantly related to the seafood industry; the Golf Park site was a garbage dump, and now is used as a golf course.

The impact of using either of these Interbay sites would be in conflict with valuable development: as many as 60 businesses would be displaced if the Commodore Way site is used, and the relocation of a golf course would be difficult in a highly urbanized city.

Legal and institutional. These considerations are developed in the Regional EIS. Alternative G complies with PL 92-500.

Agency goals. Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance, and CSO control.

It is debated whether the position of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would "provide an open space of quiet and tranquility for the citizens of Seattle; and whether the facility effects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out, parenthetically, that the West Point facility was constructed long before the Discovery Park land was acquired from the Fort Lawton Military Reservation.

Development of the Interbay site does not satisfy the goal of PSCOG of "encouraging conservation efforts and maximizing utilization of utilities and services before increasing supply" when the fully built facility at West Point is not used to full potential. However, this alternative does make efforts to fulfill the PSCOG goal of "maintaining the natural beauty and liveability of the region," at West Point at least, by not expanding the facility at this site. It does not fulfill the PSCOG goals of making "existing public utilities, facilities and services be used to their fullest prior to expansion," nor does it "consider employment distribution," if the Commodore Way site is chosen (such an action would transfer 700 to 800 jobs). Further, if the Commodore Way site is chosen, by displacing as many as 60 businesses, it would thwart the following objectives stated in Goals for Seattle: "Encourage industries that more fully utilize Seattle's resources . . .Help small local firms expand . . . promote individualism inherent in intrepreneurship . . . Ensure adequate consideration of the particular economic interests of Seattle citizens in relation to their local region." This is considered adverse, major, long-term, reversible, and definitely would occur if Alternative G is implemented in its present form.

Although the goal of the Discovery Park Master Plan would be to "provide open space", even before the park was conceived, this purpose was already infringed upon by the placement of the West Point facility. Under this alternative, that situation would not be alleviated. Expansion of the West Point facility with only a slightly greater impact may be more acceptable than encroachment on a new site.

Employment and costs. Employment and cost impacts are analyzed in the Regional EIS.

It may be useful to note that if the Commodore Way site is used, 700 to 800 jobs would be transferred.

Social, recreational and cultural. Under Alternative G, the West Point facility would remain in its present location, maintaining restrictions on the recreational use of the West Point area. Because of the location of a fence, the beach north of the facility cannot be used at high tide; the sludge basin restricts access to the south beach.

If the Commodore Way site is committed to a wastewater treatment facility, it would incise a major seafood processing community, as discussed in Chapter II. The businessmen in this community are concerned that the Commodore Way site is being considered. This impact is considered adverse, major, long-term, moderately regional, irreversible, and would definitely occur if the Commodore Way site is chosen.

Development of the Golf Park site would displace a well-used municipal golf course, which would be difficult to relocate in urbanized Seattle.

Further, local residents could consider it a social stigma to have both the West Point and Interbay sewage treatment plants in their neighborhood. These impacts are considered adverse, major, long-term, irreversible and definite.

This alternative complies with the wish of 60% of the 377 randomly selected Magnolia area people polled that secondary treatment be implemented. This impact is considered favorable, major, long-term, reversible and probable.

Archeological and historical. Since no construction would occur at the West Point site, there would be no new impact on archeological or historical sites at West Point.

Both Commodore Way and the Golf Park site have undergone much construction, reducing the chances that an intact archeological site would be found in those areas. No recognized historical places are on the Commodore Way or Golf Park sites.

Health and safety. An unlikely safety hazard is accidental leakage of chemicals while in transport or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been few accidents involving chemicals.

The health and safety risks related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction risks to safety would be the same as for other construction of a similar nature; they would be adverse, minor, last only for the duration of construction, may be reversible, and are unlikely.

Aesthetics and nuisance. The West Point wastewater treatment facility is well designed for consideration of aesthetics. It lies low, is clean, and is surrounded by well-kept grass. Few odor complaints have been filed. Visibility of the West Point facility from Discovery Park is blocked by bluffs. Only 10% of the 377 randomly selected Magnolia residents interviewed by Gerhardt Research were opposed to the location of the West Point facility.

Placement of a wastewater facility at Commodore Way would displace many; those remaining could object to the presence of an adjacent wastewater facility. This would place a stigma on those who vend fish, and would discourage boating and harboring in this area (letters from Salmon Bay Improvement Association). This impact is considered adverse, major, long-term, irreversible, local, and probably would occur.

The Golf Park site would be visible from local residences, and odor is also of potential concern. Before construction, much of the garbage which has been collected for twenty years would have to be excavated. During this process, methane and noxious sulfur dioxide gases might be released. These impacts are considered adverse, minor, short-term, irreversible, local, and may occur.

The noise and traffic of sludge trucks is a minor nuisance which did not seem to be of great concern. Some people polled were unaware of which route the trucks traveled (HRPI, 1976). The sludge traffic is expected to approximately double under this alternative.

CSO's will be discussed in the Regional EIS, and in the water quality section of this EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, these facilities would occasionally receive slugs of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

The possible silting over of salmon spawning grounds during the construction of the Kenmore parallel (Lake Line Option) called for under this alternative could cause impacts, both environmental and economical. Therefore it is recommended that an evaluation study be made on the Force Main Option to determine its possible impacts. Not enough information is presently available to consider this option.

If the Lake Line option is selected, the use of washed gravel as backfill in the construction of the Kenmore parallel interceptor could encourage salmon spawning, as in the construction of the North Mercer Island interceptor in 1970. Such a measure, however, would require the cooperation of both federal and state agencies to be successful. Timing construction to avoid spawning and intragravel development for salmon would limit construction to the months of March to September, probably increasing construction costs. Further environmental analyses would be conducted prior to construction.

Interim development (or "undevelopment") of the West Point site under the phase-out alternative might involve sludge lagoon removal, creation of salt and possibly freshwater marsh areas in the north beach, relocation of security fences to create more usable public areas, and interim landscaping improvements. Since the north seawall would have to remain until the plant was removed, major improvements might be concentrated in the south beach area. These are indicated in Figure 3-13. Although funding sources are not dealt with here, it is perhaps true to state that such improvements would probably not be covered under federal secondary treatment grants. More details of this are in the Facility Plan. Removing the sludge lagoon would eliminate any effects of the structure on longshore sediment transport, erosion and deposition.

Under this alternative, the Interbay facility would have a wet weather outfall into Elliott Bay. It would be useful to monitor water quality, biology, and currents in this area prior to construction to determine where best to have the outfall discharge.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Combined sewer overflows. This alternative does not take adequate measures to control CSO's; they will still occur in wet weather.

Land use. Land is required in all alternatives; the question is: where will the impact occur.

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest.

Operation and maintenance and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks cost money. The facilities must be operated and maintained.

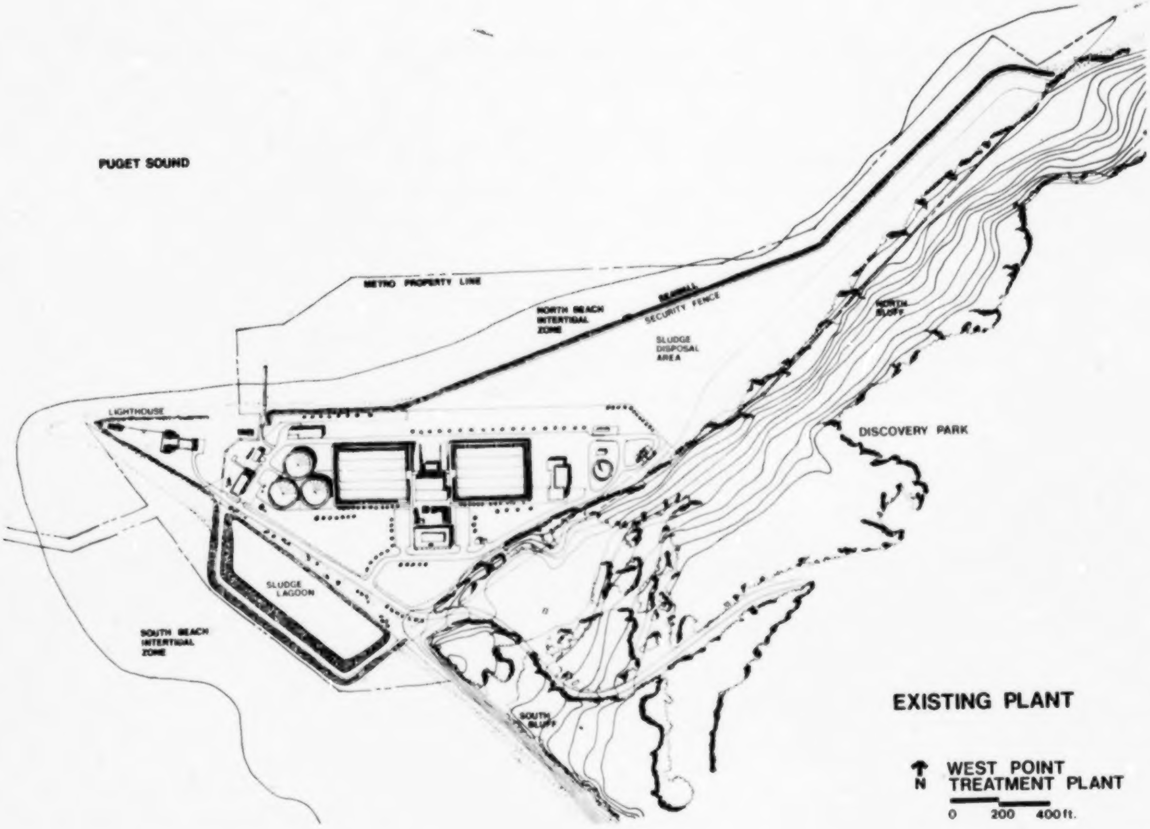
PUGET SOUND
METRO PROPERTY LINE
NORTH BEACH INTERTIDAL ZONE
SEAWALL
SECURITY FENCE
SLUDGE DISPOSAL AREA
NORTH BLUFF
LIGHTHOUSE
DISCOVERY PARK
SLUDGE LAGOON
SOUTH BEACH INTERTIDAL ZONE
SOUTH BLUFF
EXISTING PLANT
N
WEST POINT TREATMENT PLANT
0 200 400ft.

Figure 3-13
West Point – – Alternative G

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

Secondary effluent effect on water quality and biota. Nutrient inputs to Puget Sound would continue at baseline levels; remaining BOD, solids and other loads would continue to exert some effect on water quality.

ALTERNATIVE H
DECONSOLIDATION/RECLAMATION

Alternative H provides for growth in north and east service areas by provision of new plants. Secondary treatment would be provided at West Point.

Service Areas

The West Point service area would be reduced by the service areas tributary to the Kenmore and Lake Sammamish plants. Val Vue would be transferred to Renton.

Dry weather flows of 121 mgd and wet weather peak flows of 350 mgd would be treated at West Point.

Treatment Plant

Activated sludge is the preferred treatment system for upgrading to secondary treatment at West Point and nutrient removal, filtration, carbon adsorption and ion exchange plus secondary would be provided at Lake Sammamish plants. Secondary treatment by 1985 would require twelve acres of shoreline fill at West Point, as in Alternative E (Figure 3-13). New structures would include aeration tanks, secondary clarifiers, chlorine contact and dechlorination facilities. Effluent with a quality of 30 mg/l BOD and SS would be discharged through the existing West Point outfall. Details on the inland plants are described in the Regional EIS (Volume I).

Combined Sewer Overflows

CSO's to the West Point service area would be reduced slightly (about 15%) compared to Alternative B, due to reductions in the West Point service area.

Sludge

Sludge from West Point and dewatered sludge from Richmond Beach would be processed by anaerobic digestion, dewatered and trucked to the Cedar Hills landfill for disposal and to Pack Forest for recycling research.

Impacts

The direct impacts due to the implementation of this alternative projected to the year 2005 are described in this section. Secondary impacts are discussed in the Regional EIS which is Volume I of this series.

Geology, Soils and Topography

Alternative H requires expansion of the West Point facility, including shoreline fill. The installation of activated sludge facilities for secondary wastewater treatment would require a total of 54 acres, 12 of which would be shoreline fill. Some construction may be at the base of the unstable bluffs bordering the site to the east. Building at the base of the bluff could have potentially major adverse effects from landslides. With retaining walls of upland drainage and fill at the toe of the slope, the site would probably be sufficiently stable to permit construction at the base. The effect is judged to be minor as mitigated, limited in extent and a long-term problem.

Earthquake damage is considered to be potential for structures on fill in this area. Low structures, such as those planned, would be susceptible to damage primarily from differential settlement of soils caused by ground shaking. It is assumed that structures would be designed to withstand such events. The impact could still be major, but would be limited in extent and of short duration.

Air Quality and Odors

Upgrading the West Point plant to secondary treatment would increase the potential for odors escaping in this area. Because secondary treatment plants are larger and more complex than primary facilities, expose more water surface area to the air and subject the water to more perturbation, there is a greater likelihood for odors being released into the surrounding neighborhood from secondary treatment plants. Various practical measures can be employed, however, to control treatment plant odors and are discussed in the section on mitigation measures. The impact from odors is judged to be minor, limited in extent, and intermittent but continuing.

Dust from construction could be a major short-term problem. Odors and aerosols from normal plant operation would be slightly increased but limited, still minor and of short duration. Emissions from increased sludge truck trips and employee vehicle traffic are considered to be minor, limited in extent and of short duration due to the good air circulation on and near the site. Control of CSO's would reduce the occurrence of CSO-derived odors.

Water Quality

Puget Sound. Under Alternative H, secondary effluent would be discharged from West Point. Secondary treatment would reduce the discharge of suspended solids 79% relative to the baseline alternative and BOD 84%. The flow from West Point would be reduced 15%. The increased efficiency of solids removal and chlorine contact facilities could improve microbiological quality of the effluent. Discharge of heavy metals, PCB's and pesticides will decrease if these are associated with particulates. There would be no effect on Puget Sound temperature, salinity, dissolved oxygen or BOD. Overflows to freshwaters in the West Point service area would decrease by 12% to 15%, to saltwaters not at all.

Very minor reductions in nutrients from secondary treatment would be offset by continued contributions from CSO's to salt waters. The overall adverse impact at West Point would continue to be moderate; limited to waters near West Point; long-term because the discharges would continue through the planning period; and reversible.

CSO's would also continue to degrade microbiological quality, but as CSO's are relatively small near West Point, the overall adverse impact is judged to be minor, limited in extent, long-term, and reversible. Heavy metals removal efficiencies would be substantially higher than for enhanced primary treatment, but metals would still be released to the Sound from CSO's and other sources not controllable by Metro wastewater facilities. For toxic compounds, small improvements from secondary treatment would be offset by continued CSO's. The overall positive effect would be minor, because toxicant concentrations are not excessively high in effluent now; limited in extent; long-term, because the discharges would continue through the planning period; and irreversible because of the non-degradable nature of the contaminants.

Groundwater. Groundwater levels could have a minor, limited but long-term negative impact if dewatering is necessary at the construction site. The West Point effluent, discharged to Puget Sound, is incapable of infiltrating groundwater.

Biology

West Point would meet secondary treatment requirements. Inland plants at North Lake Sammamish and South Lake Sammamish would meet advanced treatment requirements and decrease flows to West Point. CSO could be at best slightly reduced (12% to 15%). Shoreline fill would be required.

Terrestrial habitats. Major expansion at the West Point site would require shoreline fill and construction in the meadow northeast of the existing facility. The meadow, now grown over with grasses and shrubs, provides a habitat for ground nesting birds and small mammals. The meadow area also supports a floral community unique to West Point and the north beach of Discovery Park, including three species of plants rare in this area. Expansion at the site would remove this habitat permanently. The effect would be major, adverse and irreversible, but highly limited in extent.

Shoreline habitats. Marshes at Lake Washington and the Ship Canal would receive slightly reduced levels of overflow loads and flows (15% and 12% respectively) compared to Alternative B baseline levels. The benefit of Alternative H is considered to be probably very minor; fairly extensive, as most marshes are subject to overflows; and of long duration as overflows are continuing phenomena.

The intertidal. Overflows to the intertidal at Elliott Bay would be at baseline levels (Alternative B) in Alternative H, which is judged to have no further impact from these sources. As treatment plant effluent reaches beach areas near the outfall at least occasionally, effluent volume and quality is still a concern. Under Alternative H, flows would be essentially the same as baseline levels. Nutrient levels would also be the same, as these parameters (especially nitrates) are not removed in significant amounts by secondary treatment. At West Point, loads of solids and BOD, (and associated metals and toxicants) would be significantly reduced by about 79% and 84% respectively. The nutrient impact on the intertidal would be essentially as in baseline levels.

A major reduction in metals in effluent could mean that levels in clams and algae at West Point could decline to background levels (Point No Point). As standards for metals are not exceeded anywhere in the study area, however, the benefit is considered to be minor-to-moderate, but possibly extensive and certainly of long duration.

Bacterial levels in the intertidal waters exceed state fecal coliform standards for shellfish waters. As CSO's to salt waters would continue essentially at baseline flows and loads, pathogen inputs would be at present levels. As the sources and their relative contributions of the bacteria have not been identified, it cannot be determined whether or not coliform standards for shellfish waters would be met under Alternative H. Shellfish consumption could continue to represent a potential public health risk.

The intertidal north of West Point would be adversely affected by the placement of shoreline fill. The fill would cover an area formerly used as a raw sewage discharge area and sludge bed. Impacts include local displacement of benthic organisms and intertidal communities, and local loss of habitat for nearshore organisms. The immediate effect is judged to be adverse and major but highly limited. Resident populations of benthic organisms would be permanently displaced from a localized area. Most would recolonize the area, attracted to the stable environment provided by the riprap. Intertidal flora would thus be affected in a minor way only, as they could reestablish on the rock. In time, intertidal organisms could be generally benefited by the improvement in effluent quality, and the new habitat available.

Puget Sound. All facilities would have secondary treatment.

Enhancing effects of nutrients on phytoplankton productivity extremes would continue locally at baseline levels. Levels of metals in plankton near West Point would probably decrease, however: a minor benefit, limited in extent but of long duration as those metals would no longer enter the Puget Sound food web and be concentrated.

Effects on benthic community abundance and diversity in the characteristic effluent plume location would continue almost at present levels if due to nutrients, as loads would decrease about 15%. If the effects are due to solids and organic matter, they could decrease with the 79% and 84% reduction in those loads due to secondary treatment. The abundance of clams and worms, which are suspension and/or deposit feeders could become less pronounced at the 150 foot contour. This possible effect is judged to be positive, minor, somewhat limited in area and of long duration as flows would continue.

The effect on free-swimming life of secondary treatment of effluent is difficult to assess. Fish could continue to be attracted to the outfall pipes and to the attached marine life. Likewise, the slightly elevated incidence of tumorous flatfish at West Point has not been explained. Whether or not the frequency of occurrence would change due to improved effluent treatment cannot be determined. Dechlorination, however, would eliminate chlorine toxicity potential of effluent.

Commercial and sport fisheries. Overflows to Lake Washington and Ship Canal would decrease slightly (15% and 12% respectively), but the fish run could be severely affected by discharge of effluent from the North Lake Sammamish plant into the Sammamish River. The effluent from the North Lake Sammamish plant would be designed to meet discharge standards, but would probably be of a higher temperature than the river water in summer. The effect would be to raise the river temperature by 1 to 2°F, which could be significant, as the river is already at temperatures intolerable to summer fish migrations. The adverse effect on fish populations could probably be major and extensive, and cause a long term decrease in fish population size. The effect is considered to be reversible.

Effects on saltwater nearshore areas where larval and juvenile fish tend to congregate and feed would be as in baseline conditions relative to CSO's as these inputs would continue unabated. Effects of secondary treatment of effluent could mean reduced exposure of sensitive larval and juvenile fishes and invertebrates (such as shrimp and crabs) to metals and toxicants. These parameters are not known to be a problem at present, however.

Freshwater environments. The impacts on these waters as in previous alternatives are primarily a function of overflow control. Under Alternative H, there would be 12% to 15% control.

Lake Washington. With slight (15%) overflow abatement, negative impacts on lake biota would be essentially as in baseline conditions; moderate, limited in extent to the western shore, of long duration as overflows continue and irreversible for metals and toxicants.

Green Lake. Negligible overflows to Green Lake would continue at baseline levels and have little effect as algae blooms are thought to be caused by nutrients entering via sub-surface seepage (McGreevy 1973). Stocked trout and waterfowl are not expected to be affected by overflows.

Lake Union/Ship Canal. Overflows to these waters would decrease slightly (12%) over baseline levels. The improvement would be very minor even at overflow points, and the biota would continue to be those characteristically tolerant of somewhat degraded water quality. The influence of CSO on overall water quality is unknown.

Rare and endangered species. No impacts are expected as no listed species are recorded from the study area. Sensitive and unique habitats have been discussed previously. Pigeon guillemots nest in the cliffs adjacent to the existing sludge lagoon and would not be affected by expansion of the West Point facility into the meadow to the northeast.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional EIS on an interrelated basis between the five existing Metro plants and potential new sites.

Human Environment

Alternative H has a negative impact on some human environment factors and some positive impacts.

Land use. Twelve acres of fill would be required to the northeast of the present West Point facility to accommodate the air activated or trickling basins. This fill would necessitate a permit from the Seattle Shorelines Master Plan, and the U.S. Army Corps of Engineers. The

Master Plan discourages fill unless absolutely essential. The impact of fill would be adverse, major, local, long-term, reversible and definite.

Agency goals. Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether the expansion of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would "provide an open space of quiet and tranquility for the citizens of Seattle"; and whether the facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character qnd beauty shall be preserved or sensitively developed as a second choice."

Employment and costs. Employment and cost impacts are analyzed in the Regional EIS.

Social, recreational and cultural. The expansion to the northeast of the facility would greatly limit the public access to the northern beach. This is considered adverse, minor as the beach is submerged at high tide, long-term, irreversible, local and definite.

This alternative complies with the wish of 60% of the 377 randomly selected Magnolia area people polled that secondary treatment be implemented. This impact is considered favorable, major, long-term, irreversible, and probable.

Archeological and historical. Any archeological sites which may have existed would have already been destroyed by previous construction.

No historical sites are in the affected areas.

Health and safety. There may be fewer health risks associated with the consumption of shellfish due to the discharge of secondary effluent rather than primary, as discussed in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction safety risk would be as for any other similar construction: with safety-conscious procedures there should be only a slight chance of accidents.

Aesthetics and nuisance. The West Point wastewater treatment facility expansion would be well designed for consideration of aesthetics. It would lie low, be clean, and be surrounded by well-kept grass and screening trees. Few odor complaints have been filed, but odor problems could arise with secondary treatment. Visibility of the West Point facility from Discovery Park would be blocked by bluffs. Only 10% of the 377 Magnolia residents interviewed by Gerhardt Research were opposed to the location of the West Point facility. Although more were opposed to expansion, it was cautiously accepted as a "necessary evil."

The additional activated sludge basins would be placed such that they are not visible behind the bluff at Discovery Park. The tanks related to trickling filters, to the south of the facility, would be more visible from bluffs above, if this subalternative is adopted. These aesthetic impacts would be adverse, minor, long-term, local, reversible and definite.

The noise and traffic of sludge trucking is a minor nuisance of small concern. Some people were unaware of which route the trucks traveled (HRPI, 1976). The sludge traffic is expected to approximately double under this alternative.

CSO's will be dealt with in the Regional EIS, and in the water quality section of this EIS.

Legal and institutional. Legal and institutional considerations have been developed in the Regional EIS. This alternative meets the requirements of PL 92-500. Permits for interceptor construction are explained in the Regional EIS.

Mitigation Measures

Several mitigation measures are suggested to aid in the reduction of adverse impacts resulting from the implementation of this alternative.

Pretreatment of industrial wastes could be provided before sewage enters the West Point plant. If current practices continue, this facility would receive occasional slugs of cadmium, mercury and arsenic.

Odor of the wastewater treatment facilities can continue to be mitigated, in part, by not allowing the primary and secondary treatment systems to become anaerobic. It is under anaerobic conditions that such noxious gases as methane and sulfur dioxide are emitted.

Further evaluation could be made of measures to eliminate shoreline fill, such as tall aeration basins or stacked clarifiers. Currently under this alternative, twelve acres of fill would be necessary to accommodate low-lying secondary treatment facilities.

The following measures could be taken to improve the aesthetics and recreational usage of the West Point site, under this alternative, which includes shoreline fill under current plans:

The sludge lagoon could be removed, the area south of the existing digester could be kept open as a public activity area, and the access road and parking area could be relocated. Removal of the sludge lagoon would also eliminate any impact of that structure on longshore sediment transport.

The north beach area, including the new fill, could be substantially covered with a flat, screen-roofed, tank structure approximately 15 feet high, similar to the existing sedimentation tanks. Some possibility exists for creating a marsh habitat area between the tanks and bluffs which would give some isolation from more active public areas. These are indicated in Figure 3-14.

A new seawall would be required. The seawall could be designed to create some intertidal area by stepping since the existing rocky intertidal area would be lost. The general shape of the wall could be designed as an undulating form as suggested in the site plan, (see Figure 3-14), rather than the existing straight wall. Such a scheme requires

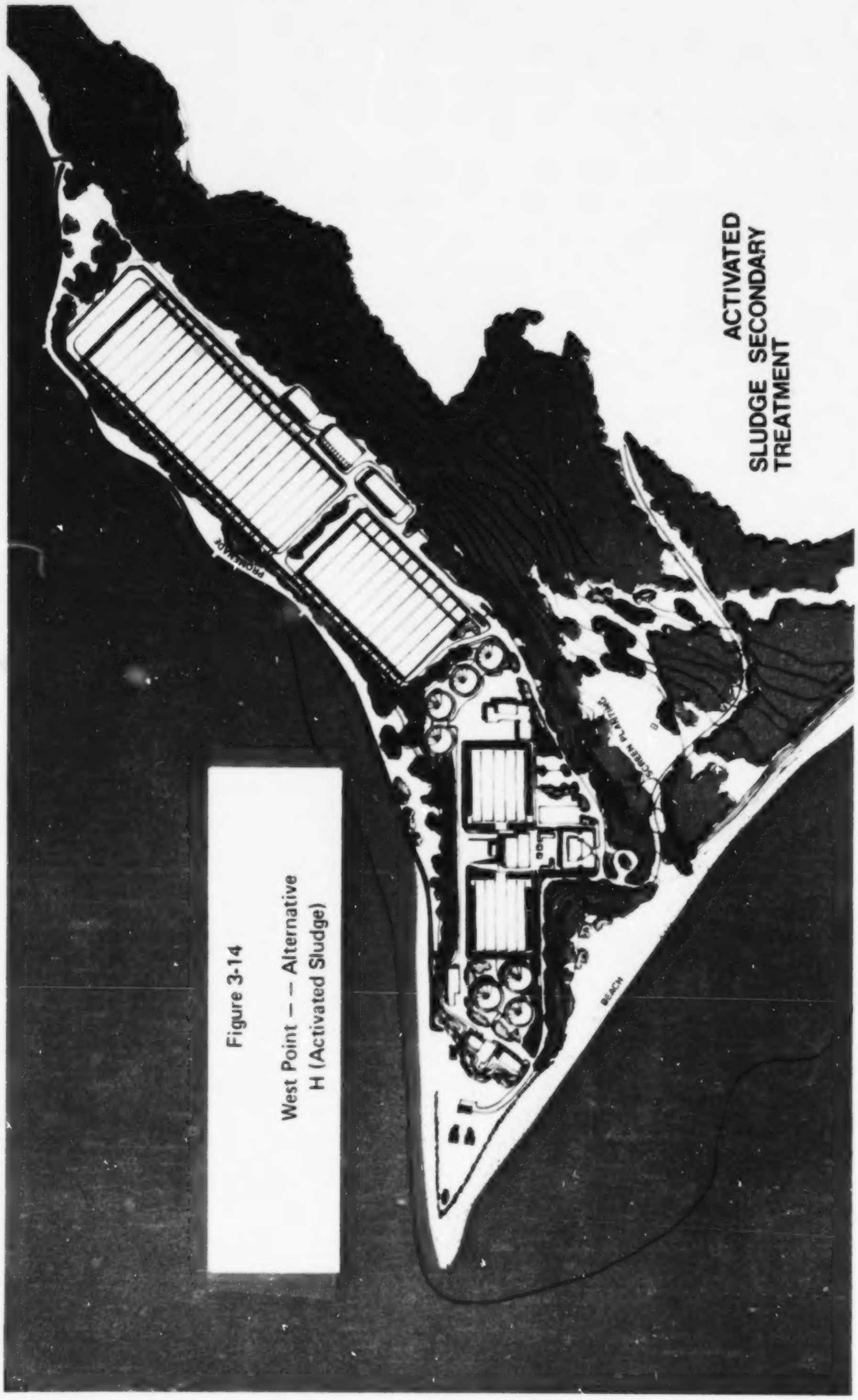
ACTIVATED
SLUDGE SECONDARY
TREATMENT
PROMENADE
SCREEN PLANTING
BEACH

Figure 3-14

West Point — — Alternative
H (Activated Sludge)

more fill but adds to the quantity and quality of public activity space.

Landscape treatment options vary from establishment of grass cover for erosion control (allowing natural succession to occur), to planting of a dense cover/screen of native shrubs and trees. Costs for these treatments vary substantially and are covered in the section on estimated costs of the Draft Facility Plan.

Unavoidable Adverse Impacts

Under this alternative, the following adverse impacts would be unavoidable.

Construction. Although construction activities can be screened from public view, they will still be a temporary nuisance.

Sludge trucking. Under current practices of disposing sludge at remote sanitary landfill sites, there will necessarily be sludge trucking.

Combined sewer overflows. This alternative does not take adequate measures to control CSO's; they will still occur in wet weather.

Land use. Land is required in all alternatives; the question is: where will the impact occur?

Aesthetic nuisance of plant location. Wastewater treatment facilities are a nuisance in all alternatives; the question is: how can these nuisances be made smallest?

Operation and maintenance and capital costs. Construction of wastewater facilities, interceptors, and CSO holding tanks is expensive. The facilities must be operated and maintained.

Energy expenditures. Energy can in part be provided by the methane produced in anaerobic digestion, but there is still a large expenditure of energy which cannot be mitigated.

Secondary effluent effects on water quality and biota. Nutrient inputs from effluent would continue at slightly reduced levels due to inland discharge; remaining BOD, solids and other loads would continue to exert some effect on water quality and biota.

SUMMARY

Geology, Soils and Topography

Potential impacts at the West Point site are evaluated with respect to slope and foundation stability, earthquake damage risk, erosion and deposition, shoreline fill stability, topography and soil profile. Construction waste and sludge disposal problems are evaluated in the Regional EIS. Alternative G included evaluations of Interbay sites for the above parameters.

All of the sites except Commodore Way are on fill, and are thus subject to potential earthquake damage from differential compaction or seismic settlement, and ground shaking. Commodore Way soils are stable, but also carry high potential for seismic damage as they readily transmit vibrations to low structures such as treatment plants. Seismic hazard risk is considered to be the same for all alternatives and structures would be designed accordingly.

There is some concern about the influence of the existing south beach sludge lagoon on shoreline sediment transport, and localized erosional and depositional conditions which may develop north and south of that structure respectively. The lagoon would remain in its present form in all eight alternatives as currently envisioned, so any existing impacts would continue.

Those alternatives requiring the most construction would have the greatest impacts on topography, soil profile, and be affected most by slope and foundation stability. At the West Point site, Alternatives E, F and H would have the greatest impacts, in requiring expansion of the site to the base of unstable cliffs, excavation of existing unstable fill plus piling and dewatering of foundation soils. In addition, Alternatives E and H only require the placement of 12 acres of shoreline fill. The fill would be protected by rock rip-rap from erosion, but could alter longshore sediment transport.

Alternative G has the greatest overall earth impacts. Extensive construction could be required at either Interbay site. At Commodore Way dewatering could be required, but no piling as soils are stable. At the Golf Park site, piling would be required plus major excavation of existing landfill materials with attendant changes in soil profile and topography. In addition, Alternative G includes the substantial impacts of constructing three major pipelines in the West Point service area: the Kenmore parallel interceptor, the Carkeek-Interbay connection and a major new Interbay outfall to Elliott Bay.

Alternative E has next largest impacts in having substantial effects on the West Point site (discussed previously) and including the construction of two major transfer projects, the Kenmore parallel and a Carkeek-West Point connection.

Of the other secondary treatment alternatives, H requires shoreline fill but no transfer facilities; F requires no shoreline fill but includes the Carkeek-West Point connection.

Alternatives B, C and D include the construction of new digesters at West Point requiring excavation, piling of structures and dewatering. The impacts of these activities are considered to be of approximately equal magnitude and duration. Alternative B includes a Kenmore parallel interceptor, however. Alternatives C and D include a new outfall to Elliott·Bay from the Interbay area and a north interceptor parallel with a mile-long tunnel under Queen Anne Hill. Thus, impacts of C and D are considered to be greater than in B. Alternative A includes no construction at all.

Impacts of holding tank construction for CSO control are discussed in the Regional EIS.

Air Quality and Odors

Potential impacts at the three sites (West Point, Commodore Way and Golf Park) were evaluated with respect to odors, aerosols and pathogens, particulates and other emissions including chlorine and engine emissions.

All of the alternatives including No Action involve the handling of raw sewage and chlorine, and the use of diesel and gas engines--in plant operations and/or transportation and commuting. Alternative sites are included only in Alternative G.

At the existing West Point site, odors have not been a problem as the site is generally well-ventilated and odor control techniques are routinely applied.

The risk of odor and aerosols at West Point increases with higher levels of treatment as more air-water surfaces are created and more water perturbation. Alternatives E, F and H which include secondary treatment facilities at West Point thus carry the greatest odor potential at that site. As these alternatives also require the most construction, they carry the greatest potential for temporary local air quality degradation due to particulates (dust) and engine emissions. Engine emissions would increase in the area for the life of the facility due to a doubling of sludge truck trips and an increase in employee trips. Because of the good air circulation and mixing conditions at West Point, all of the above are expected to have negligible impacts. Alternatives C and D would require less construction for enhanced primary treatment, result in fewer new water surfaces, and a smaller increase in sludge truck and employee trips. The impacts, again, are considered to be negligible. Alternatives A and B would continue present conditions.

Under Alternative G, West Point's conversion by 1985 to a wet weather facility would further reduce the potential for odor and other emissions problems at that site. The alternative sites proposed in G, however, are located in the Interbay Valley which tends to restrict air circulation and is characterized by poorer air quality than average for the study area. The Commodore Way site is located in an industrial area, and the new secondary treatment plant would not add significantly to the overall existing air pollutant load. The increment could impact neighboring businesses due to lack of a buffer zone, however.

Construction on the Golf Park site would require excavation of old sanitary landfill materials, and cause major and extensive odor and air quality problems from hydrogen sulfide and methane gases. A number of standard odor and emissions control measures would be routinely applied at all sites, but odors would not be entirely contained at the Golf Park site.

Insofar as CSO's cause odors, Alternatives C, D, F and H would provide reductions of respectively decreasing magnitudes at the Ship Canal and Lake Washington. Alternative F decreases CSO's to Elliott Bay.

Overall, Alternative G with a facility at the Golf Park site has the greatest potential for odors and air quality degradation, followed by Alternative G with a Commodore Way facility. Facilities at West Point are considered to have negligible impacts with standard control measures.

Alternatives and Impacts
Summary

Water Quality

Water resources issues analyzed for the eight alternatives include 1) changes in the quality of waters in the West Point service area due to CSO control and/or from discharge of secondary or enhanced primary effluent, 2) effects of using secondary effluent for flushing of the Government Locks, 3) effects of the construction of major transfer facilities such as the Kenmore parallel interceptor and the Carkeek-West Point connection. The effects of shoreline fill on water quality were considered to be negligible. The risk of accidental raw sewage spills due to system malfunction was judged to be the same for all alternatives, and not evaluated. Metals and toxicants were assumed to be removed in proportion to suspended solids in the alternatives.

Freshwaters

Lake Washington, and Ship Canal/Lake Union, freshwaters in the West Point service area, are affected by CSO's containing BOD, solids, silt, pathogens, oil, grease, metals, toxicants and nutrients. The Ship Canal receives about 25 times as much as Lake Washington, and is a much smaller body of water. Alternative C, Major CSO Control, would benefit these waters most in achieving a 99% CSO reduction to Lake Washington and an 84% reduction to the Ship Canal/Lake Union (93% reduction to Lake Union alone over baseline levels). Alternative D would result in an 83% reduction of CSO's to Lake Washington and about 50% to the Ship Canal/Lake Union (61% to Lake Union alone). Alternative F would also reduce CSO's, not by construction of holding tanks as in C and D, but through sizing of new facilities. Overflows in Alternatives E and G to freshwaters would remain at baseline (B) levels, i.e., no control. In addition, G includes optional secondary effluent discharge to the Ship Canal, judged to have potentially major adverse impacts. Implementation of Alternative B, Metro Comprehensive Plan, would increase overflows to Lake Washington 36 to 37% over present (A) levels, and to the Ship Canal/Lake Washington by 28 to 36%. Only C and D reduce CSO's to well below present (A) levels, and therefore represent an improvement. Clearly, Alternatives C and, to a lesser extent, D are best for freshwaters of the West Point service area. Alternative G, which could increase loads and flows to the Ship Canal over baseline levels, is considered to have the greatest potential negative impacts on freshwaters.

Effects on Green Lake were assumed to be negligible for all alternatives.

Saltwaters

Saltwaters considered in the West Point EIS include those waters of the Sound off West Point, plus Elliott Bay. Elliott Bay is subject to combined sewer overflow and pollutants from sources not controllable by Metro (dredge spoil dumps, aerial fallout, etc.), such that its quality is impaired at present.

Waters off West Point are subject to treatment plant effluent which disperses in a characteristic fashion, primarily due to tidal currents, and which comes up on beaches north and south of West Point with unknown frequency. CSO's to these waters are few and small, but waters from Elliott Bay are carried along the south beach driven by Duwamish River outflow. In addition, in Alternatives C and D, up to 161 mgd and 80 mgd of CSO's would be discharged to Elliott Bay, respectively, through a major new shallow outfall at Interbay. In Alternative G, up to 200 mgd secondary treated wet weather affluent would be discharged at that site from a new Interbay facility.

Loads and flows to Elliott Bay would decrease most in Alternative F, although by only 15%. CSO loadings would remain at baseline (B) levels in E, G and H. With the transfer of overflows from freshwaters to saltwaters in Alternatives C and D, CSO's to Elliott Bay would increase 25% and 21% respectively. Alternative C also includes a new primary wet weather outfall (up to 250 mgd) to Elliott Bay from a new Duwamish facility, discussed in the Alki EIS. Alternative G maintains CSO's to Elliott Bay at baseline levels, but adds up to 200 mgd of secondary treated wet weather effluent. Alternative C is considered to have the greatest potential negative impacts on Elliott Bay, followed by G and D. Alternative B would have the same level of CSO's to Elliott Bay as A.

West Point waters would benefit most by secondary treatment Alternative F, in which flows (and therefore nutrients, as these are not removed) are reduced 28%, solids 82% and BOD 87% over baseline (B) levels. Alternative H, with consolidation of facilities and secondary treatment would result in a 15% decrease in West Point flows, 79% in solids and 84% in BOD. In all of the other action alternatives--C, D, E and

G--flows and nutrient loads would continue at B levels. Alum addition in summer would reduce BOD and solids loads by 20% in C and 25% in D, however. Secondary treatment would reduce solids 74% and BOD 81% in E, and 72% and 80% in G. Alternative B (baseline) represents a 30% increase in loads and flows over present levels (Alternative A and 1975). Only the secondary alternatives, E, F, G and H, represent water qualtiy improvements over present conditions.

In general, Alternative C is best for freshwaters, at the expense of saltwater quality. Alternative F is best for saltwaters and achieves minor CSO control to freshwaters.

With respect to microbiological quality, C and D are best for freshwaters in reducing CSO's substantially. In saltwaters, the picture is more complicated, as multiple sources are probably involved and their relative contributions have not been determined. Alternative F would reduce CSO's to Elliott Bay and reduce effluent flow to West Point waters most. Greater solids removal, such as from secondary treatment and to a lesser extent from alum addition, potentially allows for the same or better levels of disinfection with less chlorine (about half as much and two-thirds as much, respectively). With improvement of current disinfection practices at West Point, this may be realized for the secondary alternatives E, F, G and H in the provision of chlorine contact facilities. Whether or not local waters would cease to violate state fecal coliform standards for shellfish waters under any alternative cannot be determined at present.

Biology

The eight Alternatives were analyzed with respect to their impacts on biologic systems, including terrestrial habitats, shoreline habitats, the intertidal, Puget Sound, commercial and sport fisheries, endangered species, and freshwater environments including Lake Washington, Green Lake and Lake Union/Ship Canal.

Terrestrial Habitats

The terrestrial habitat of interest is a meadow north of the treatment plant in an area formerly used for sludge disposal. Shrubs and grasses now provide a habitat for ground nesting birds, and small mammals. Three plant species found in the meadow are rare or unknown elsewhere in the

Park and used in Discovery Park programs (Metropolitan Engineers Task D3, 1976). This habitat would be eliminated in Alternatives E, F and H with expansion of West Point for secondary treatment.

Shoreline Habitat

Freshwater marshes which occur in Lake Washington and in the Lake Union/Ship Canal are subject to combined sewer overflows. Marshes are considered to be sensitive habitats as they are highly productive, have limited dilution and mixing properties and support a wide variety of birds, mammals, fishes and other vertebrates. Sewer overflows contain metals, pesticides, toxicants, BOD, solids and other parameters that can stress biota in a variety of ways. The marshes are benefited most by Alternative C, major CSO control, which would reduce loads and flows by 99% to Lake Washington, and 84% to the Ship Canal. Second best is D, Partial CSO Control, which would reduce these overflows by 83% and about 50% respectively. Alternative F, Southern Strategy, would mean 31% reductions; Alternative H would reduce Lake Washington overflows by 15%, and those to the Ship Canal by 12%. Alternatives E and G continued overflows to these waters at baseline (B) levels. Baseline levels are higher than present and Alternative A levels by 37% and 28-36% for these areas.

The Intertidal

The West Point intertidal is subject to sewer overflows inputs primarily from Elliott Bay and Magnolia. There is also evidence of treatment plant effluent coming ashore at West Point. The frequency and distribution of the events are unknown. An apparent enrichment of algae at West Point has been a suggested result. Also, fecal coliform bacterial levels exceed state shellfish water standards at all sites in the area. The source of bacteria has not been identified. No effects of effluent have been suggested on intertidal animals except grazers on algae which appear to show increased growth rates at West Point.

Overflows are small inputs relative to effluents; their frequency is fairly well-known and quality poorly known. By contrast, effluent quality is fairly well known and frequency of impact in the intertidal unknown.

Overflows to the intertidal (Elliott Bay) would be slightly reduced (15%) by Alternative F, Secondary/Southern Strategy, and slightly increased by Alternatives C and D. CSO levels would continue at baseline levels for Alternatives A, B, E, G and H.

Effects of solids and BOD, and associated metals and toxicants, in effluent would be reduced by 60 to 85% below baseline levels by secondary Alternatives E, F, G and H. Enhanced primary treatment Alternatives C and D, reduce these parameters by 20% below baseline B levels to present (A) and 1975 load levels. So C and D represent a nondegradation over present levels, but E,F, G and H actually improve effluent loads substantially. The best alternative for the intertidal overall is F.

Shoreline fill in Alternatives E and H would have a moderate but highly limited and short-term negative impact on intertidal biota due to the placement of the fill and removal of the existing seawall substrate. The ultimate effect could be negligible or, even beneficial, however, in that the new sea wall could support essentially the same or more life forms in a fairly short time. As the fill would cover an area formerly used as a raw sewage discharge area, it cannot be said to be disturbing a pristine environment.

Puget Sound

This category includes the biota of nearshore and offshore waters, which are affected far less by sewer overflows than by effluents as overflows tend to disperse along shore rather than out into open waters. An increase of 15 to 20% in the maximum size of algae blooms near West Point has been attributed (possibly) to effluent nutrients. Nutrients would decrease to the Sound at this point only in Alternatives F (by 28%) and H (by 15%). Total nutrients loads to Puget Sound would be essentially unchanged in all Alternatives but F, however.

Apparent changes in the diversity, abundance and composition of bottom communities occur at West Point in the typical effluent plume position and along the depth contour at which effluent has neutral buoyancy. The effects on animals are judged to be more related to solids and BOD loads than nutrients, and so are possibly more affected by effluent treatment levels. Thus secondary treatment Alternatives E, F, G and H would probably decrease in time the magnitude of the effect seen. Alternatives C and D would maintain it at present (1975) or A levels but would represent a decrease from baseline (B) levels. Higher metals levels in Puget Sound biota near the outfalls could be similarly reduced more by E, F, G and H, as secondary treatment removes more metals than enhanced primary treatment.

The cause(s) of the elevated incidence of tumorous flatfish at West Point has not been identified. The presence of the outfall pipe and/or its contents may be involved, but to an unknown extent. As a result, the effects of the various alternatives on disease incidence cannot be determined.

Chlorine feed rate is residual paced at West Point, but peaks in residual chlorine are not uncommon. In addition the residual is measured a short distance downstream of the chlorine feeding point, and therefore, does not reflect the actual chlorine residual before discharging into Puget Sound. Control of chlorine residual could be achieved by the installation of a chlorine contact tank. These conditions would continue under Alternatives A, B, C and D. Secondary treatment Alternatives E, F, G and H include chlorine contact facilities and thus allow for the optimization of disinfection. Overchlorination which is possible with current disinfection practices can cause toxic residuals in effluent. Residuals have been shown in the laboratory to occur at close to threshold levels for chronic effects, but no toxic effects have been observed in the field. Dechlorination, provided in Alternatives E, F, G and H, would eliminate potential effluent toxicity due to residual chlorine.

Commercial and Sport Fisheries

Migratory fish runs up the Ship Canal through Lake Washington would be benefited by Alternatives C and F that reduce overflows most to these waters, by Alternative F, which achieves 25-31% reductions, and to a lesser extent by 11-15% reductions under Alternative H.

Freshwater Environments

These are affected primarily by overflows, except in B, E and G where construction of a Kenmore Parallel interceptor would temporarily disrupt the northwest shore of Lake Washington.

CSO's to freshwaters would be reduced most by C and by D, and by F to a more moderate extent. A slight decrease would be achieved by H. Baseline (B) levels would continue in E and G.

Rare and Endangered Species and Sensitive Habitats

No listed rare or endangered species are recorded from the study area. Critical or sensitive habitats, such as salmon spawning and rearing areas, fish migration routes, waterfowl areas and lake shallows were discussed in other sections. CSO control generally benefited these most.

Pigeon guillemot nesting areas in unstable cliffs adjacent to the facility would probably not be affected if plant expansions (such as in E and H) tend to undercut the cliffs as these birds nest in cliffs adjacent to the sludge lagoon and expansion would be in the northeast meadow.

The meadow habitat with its three rare plant species would be eliminated in Alternatives E, F, and H with expansion of West Point for secondary treatment.

Natural Resources and Energy

Natural resources and energy impacts are analyzed in the Regional Environmental Impact Statement on an inter-related basis between the five existing Metro plants and potential new sites.

Human Environment

A comparison of impacts on the human environment is as follows:

Land Use

Alternatives A and G would not expand the West Point facility. Alternative B would have four additional tanks for digester capacity just northeast of the existing facility. Alternatives C and D would have two additional tanks for chemical feed just northeast of the existing facility. Alternatives E and H would have either air activated sludge or tower trickling filters along the shoreline northeast of the existing facility. This expansion would require 12 acres of fill; the secondary addition would take up as much land space as the primary facility now takes. In Alternative F, oxygen activated sludge facilities would be installed. This would require no additional fill area, but would use up much of the remaining available space to the northeast of the existing facility. The order of impact on land, in increasing sequence, would be Alternatives A and G, Alternative B, Alternatives C and D, Alternative F, Alternatives E and H.

The expansion of the West Point facility will have an impact on the land usage in this area, but it is felt that the impact of adding on to the facility is not as great as the impact of constructing the West Point facility at this location in the first place.

It is questionable whether the public would want to use a public beach which is so close to a wastewater treatment facility, especially when the beach is currently adjacent to a sludge lagoon.

Alternative G would implement a wastewater facility in the Interbay area. Both the Commodore Way and Golf Park sites are already developed. Sixty businesses would be displaced if the Commodore Way site is used.

Legal and Institutional

These impacts are developed in the Regional EIS. Alternatives E, F, G and H comply with PL 92-500; Alternatives A, B, C and D do not.

Agency Goals

Many of the impacts related to agency goals have been developed in the Regional EIS, including those goals related to PL 92-500 compliance and CSO control.

It is debated whether the position or expansion of the West Point treatment facility enhances the goal of the Discovery Park Master Plan that Discovery Park would provide an "open space of quiet and tranquility for the citizens of Seattle;" and whether the facility affects the objective stated in Goals for Seattle that "natural amenities identified as important to the region's character and beauty shall be preserved or sensitively developed as a second choice." It may be useful to point out parenthetically, that the West Point facility was constructed long before the Discovery Park land was acquired from the Forth Lawton Military Reservation.

Under Alternative G, development of the Interbay site does not satisfy the goal of PSCOG of "encouraging conservation efforts and maximizing utilization of utilities and services before increasing supply", when the fully built facility at West Point is not used to full potential. However, this alternative does make efforts to fulfill the PSCOG goal of "Maintaining the natural beauty and liveability of the region," at West Point at least, by not expanding the facility at this site. Nor does it fulfill the PSCOG goals of making "existing public utilities, facilities and services be used to their fullest prior to expansion," nor does it "consider employment distribution," if the Commodore Way site is chosen (such an action would displace 700 to 800 jobs). Further, if the Commodore Way site is chosen, by displacing as many as 60 businesses, it would thwart the following objectives stated in Goals for Seattle: "Encourage industries that more fully utilize Seattle's resources . . . Help small local firms expand . . . promote individualism inherent in entrepreneurship . . . Ensure adequate consideration of the particular economic interests of Seattle citizens in relation to their local region." This is considered adverse, major, long-term, reversible, and definitely would occur if Alternative G is implemented in its present form.

Employment and Costs

Employment and cost impacts are analyzed in the Regional EIS.

It may be useful to note that if the Commodore Way site is used under Alternative G, 700 to 800 jobs would be displaced.

Social, Recreational and Cultural

Under all of the alternatives, the West Point facility would remain, or be expanded, in its present location, maintaining restrictions on the recreational use of the West Point site. These impacts are considered adverse, minor, long-term, irreversible, local; and definite, increasing in impact with the extent of land used.

If the Commodore Way site is condemned to a wastewater treatment facility, it would incise a major seafood processing community, as was discussed in Chapter II. This impact is considered adverse, major, long-term, moderately regional, irreversible, and would definitely occur if the Commodore Way site is chosen.

Development of the Golf Park site would displace a well-used municipal golf course, which would be difficult to relocate in urbanized Seattle.

Further, local residents would consider it a social stigma to have both the West Point and Interbay sewage treatment plants in their neighborhood. These impacts are considered adverse, minor, long-term, irreversible, and definitely could occur if Alternative H is implemented.

Sixty percent of the Magnolia area residents would like to implement secondary treatment (HRPI, 1976). Alternatives A through D would not fulfill this desire; Alternatives E through H would.

Archeological and Historical

In the West Point-Interbay area, no known archeological sites would be affected; no recognized historical places would be impacted.

Health and Safety

Under Alternatives A through D, there may be health risks related to eating shellfish which have been affected by primarily treated effluent. Alternatives E through H may alleviate this problem by implementing secondary treatment, as described in the biological section of the EIS.

An unlikely safety hazard is accidental leakage of chemicals when they are in transport or handled on site. Although nearly every U.S. water and wastewater treatment facility uses chemicals, there have been very few chemical-related accidents.

The health and safety problems related to sludge transport and disposal would be as probable as for any other trucks in transit.

Construction risks to safety would be the same as for other construction of a similar nature; they would be adverse, minor, last only for the duration of construction, may be reversible, and are unlikely.

The risks related to chemicals, sludge transport, and construction would be proportional to their magnitude. In these categories A and B would be least impactive, C and D next; E, F and H next; and Alternative G most impactive because of major construction at the Interbay site.

Under Alternative F, with the oxygen activated sludge method of secondary treatment, oxygen is mixed into the activated sludge basin for the respiratory functions of the microorganisms which digest sewage. If this oxygen comes into contact with hydrocarbons (e.g. gasoline) in the presence of a spark, there could be an explosion. However, this situation should never arise. Oxygen activated sludge facilities are designed to provide continuous monitoring of hydrocarbon concentration. An alarm will sound far below dangerous hydrocarbon levels, and oxygen would automatically be vented to bypass the activated sludge basin. The impact of an explosion could be adverse, major, long-term, reversible, but would be highly unlikely. Although oxygen activated sludge facilities are used around the country, there have not yet been any incidences of explosion.

Aesthetics and Nuisance

Under all alternatives (other than A and G) the West Point wastewater treatment facility expansion could be well-designed for consideration of aesthetics. It would lie low, would be clean, and would be surrounded by well-kept grass and screening trees. Few odor complaints would be expected. Visibility of much of the West Point facility from Discovery Park would be blocked by bluffs. Only 10% of 377 Magnolia area residents polled interviewed by Gerhardt Research were opposed to the location of the West Point facility.

The nuisance would increase with the magnitude of expansion, as in the social, recreational and cultural section of this summary. Most expansion would occur to the northeast of the existing facility, where it would be hidden from the view of much of Discovery Park.

These aesthetic impacts would be adverse, minor, long-term, local, and reversible and definite if Alternative F is implemented.

Under Alternative G, placement of a wastewater facility at Commodore Way would displace many businesses; those remaining might object to the presence of a wastewater facility right next door. This would place a stigma on those who vend fish and would discourage boating and harboring in this area (letters from Salmon Bay Improvement Association). This impact is considered adverse, major, long-term, irreversible, local and probably would occur.

Alternatives and Impacts
Summary

The Golf Park site would be visible from local residences, and an odor is feared. Before construction, much of the garbage which has been collected for twenty years would have to be excavated. It is feared that during this process, methane and noxious sulfur dioxide might be released.

These impacts are considered adverse, minor, short-term, irreversible, local, and may occur.

Sludge trucking is a minor aesthetic nuisance. It seemed to bother only a few of those interviewed (HRPI, 1976). Sludge tracking would be approximately twice as much for Alternatives E, F, G and H as for Alternatives A, B, C and D.

CHAPTER IV

CITIZEN AND AGENCY INVOLVEMENT

The interaction between citizen and agency personnel (and their consultants) in the West Point area to date has included small group and informational meetings, community meetings, contacts with business leaders, and communication with organized neighborhood groups (particularly the Magnolia Community Club).

The first series of contacts of the Clear Water Watch program for the West Point facilities planning project were made in the spring of 1976 by Human Resources Planning Institute (HRPI), Metro's social and economic consultant. Most of these contacts were in the Magnolia area and were used to develop socioeconomic background and enumerate community-generated issues regarding West Point treatment, expansion and siting alternatives. Citizens contacted by telephone or letter during March 1976 included representatives of the Magnolia Community Club, Magnolia Commercial Club, Magnolia-Queen Avenue Chapter of the League of Women Voters, Magnolia Community Center Advisory, Magnolia Recreation Center Advisory, Magnolia Bluffers and other residents. Shirtsleeve meetings included HRPI staff and seven Magnolia residents. HRPI also organized a Magnolia focus group session on April 21, 1976, which was attended by ten Magnolia representatives.

Other people have been contacted by HRPI in developing socioeconomic information related specifically to West Point alternatives. Regarding the West Point move feasibility analysis, HRPI telephoned personnel at the Bureau of Outdoor Recreation, Interagency for Outdoor Recreation, Seattle Parks Department, Seattle Engineering Department-Traffic Section, Discovery Park, and Dan Kiley & Partners (Discovery Park master planners). The West Point move cost-effectiveness study included telephone communications with Rhine Demolition Contractor, Diex Adkinson (architects and engineers), and the Seattle Street Maintenance group.

The first community meeting in the West Point area

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was held May 24, 1976 at the Magnolia Recreation Hall. It was attended by approximately 40 Magnolia citizens, Park Board and Friends of Discovery Park members, plus a Metro Council member, Metro staff, Metro facilities planning consultants (Metropolitan Engineers), HRPI staff, and the chairperson of the Citizens' Water Quality Advisory Committee (CWQAC). The West Point treatment plant alternatives, "merit" alternatives, federal requirements and Metro's strategy were presented. Most of the concerns at that meeting related to the desire of the majority of citizens attending the meeting to avoid expansion on the West Point site. If expansion were to be at another site, the attending citizens expressed a preference for the Golf Park site over the Commodore Way site, presumably because of the existing industrial tax base there. Eliminating the plant if feasible or ameliorating existing conditions were also discussed. Recommendations for lessening the impact of the present plant on the park included removing the sludge lagoon, landscaping and screening the facility, and processing Renton sludge elsewhere. Other items relating to regional concerns that were expressed at the meeting included federal requirements for secondary treatment, the relationship between 201 and 208 planning, mechanisms for wastewater flow reduction, plant siting and sludge treatment alternatives and shoreline access. A more complete analysis of the meeting was prepared by Metro Community Involvement staff, was mailed to attending citizens, and is available for inspection by other interested parties at Metro.

The second community meeting in the West Point area was held August 4, 1976 at St. Margaret's Catholic Church. Attending were approximately 45 citizens of the Interbay community plus representatives and interested personnel from Metro staff, Metropolitan Engineers, and CWQAC. The Metropolitan Engineers Facility Plan studies, including construction proposals, Metro Community Involvement plans and the role of CWQAC in the Metro planning were presented. The major issue of concern to the citizens was the possibility of construction of an additional plant in Interbay which the majority of those attending clearly opposed. The predominant view favored avoidance of building at the Commodore Way or Golf Park sites and minimization of the impacts of expansion on the existing West Point site. The West Point site was favored based on comparison with the Interbay area's population density and other socioeconomic traits, and importance as a tax base. With respect to cost-effectiveness, the census was that building at Interbay was wasteful of funds as a site already existed at West Point.

Other items discussed included Discovery Park, its historical uses and present use evaluation, and risk of neighborhood hazards due to chemicals routinely used in wastewater treatment. In addition, some doubt was expressed concerning the sincerity of Metro's efforts to solicit and incorporate public opinion in the facility planning. For more detailed information on the August meeting, the reader is referred to a Metro summary mailed to those in attendance which is available for review at Metro.

A third community meeting was held on September 13, 1976 at the National Guard Armory to discuss an Interbay treatment plant. Attending were approximately 85 Interbay area citizens plus a Metro Council member, Metro staff, a representative of the Metro facility planning consultant (Metropolitan Engineers), HRPI staff and a member of the Citizens Water Quality Advisory Committee. The Metro strategy, federal requirements, "core" alternatives and West Point treatment plant alternatives were presented. A major concern at the meeting related to the desire of the majority of citizens attending the meeting to avoid construction of a major new treatment plant at Interbay. Impacts on Interbay and its residents were discussed with respect to land (amount required and acquisition methods), water quality (effects of an outfall on Salmon Bay and salmon runs), air quality (odors, chlorine and other gases, and restricted circulation at Interbay), and social (effects of a treatment plant on adjacent property values; impacts on nearby residents versus on Discovery Park).

Other issues raised included ramifications for the Metro service area of PL 92-500 and potential impacts of Metro's resistance to its requirements, and impacts of the State Shorelines Management Act and the Seattle Comprehensive plan on West Point planning. Citizens attending were also concerned about zoning and land use at targeted sites, and the issue of regional versus local wastewater treatment, including the reliability of a large facility and its susceptibility to earthquakes or sabotage. Comments also addressed the possibility of further alternative sites and the cost effectiveness of CSO control. Citizen participation opportunities and importance to the planning process were of further concern, as was the process scheduling. More detailed analysis of the meeting is contained in a summary prepared by Metro that was mailed to those in attendance and is available for review at Metro.

The fourth community meeting in the West Point area was held November 17, 1976 at the Blaine Junior High School Auditorium. Attending were approximately 85 citizens plus representatives and interested personnel from Metro Council, Metro staff, DOE, EPA, Metropolitan Engineers, John Morse and Associates (Metro's architectural consultant), HRPI, James M. Montgomery Consulting Engineers, Inc. (Metro's EIS consultant), and CWQAC. Panel members discussed planning alternatives ("no action", "legal", and "goal") and issues, architectural alternatives and social impacts. The major issue of concern to the citizens and business people was the location of possible West Point expansion. In contrast to the first community meeting, the majority of attendees who expressed a preference favored expansion at West Point rather than at Commodore Way or Golf Park sites in the Interbay area. The difference in preference appears to be due to the fact that the first meeting was attended primarily by homeowners who live near West Point and the fourth meeting was attended by greater numbers of people with business interests in the Interbay area.

In the six months from the first to the fourth public meeting, the tide of opinion appeared to change, with the increasingly persistent and vocal concern of residents and businessmen of the Interbay area. Magnolia residents appeared to focus more on site - specific issues at West Point rather than on plant relocation.

Other issues that were raised at the fourth meeting relative to plant expansion/relocation included economic effects of condemnation and relocation, the need for a social survey for the Commodore Way and Golf Park sites, competing uses of Discovery Park, economic and recreational values of the fishing industry, the number of people affected by plant location at alternative sites, and the structural suitability of alternative sites. Comments on system or regional planning addressed the location and timing of treatment plants, service area designations, sludge treatment locations, selection process and definition of alternatives, the applicability of federal secondary treatment regulations for Puget Sound, and a concern for water quality. Site-specific issues of odor were also mentioned at alternative sites. For more detailed information on the November meeting, the reader is referred to the Metro summary that was mailed to those in attendance and is available for review at Metro.

Since the November 17, 1976 community meeting, Metro staff have been in contact with other people regarding the West Point alternatives. Typical of these contacts was a telephone call from a Commodore Way businessman, who stressed the economic importance of the Commodore Way area and requested that businesses in that area be kept better informed of the project, which Metro has taken steps to do.

Another example of citizen input is the February 10, 1977 letter from the Magnolia Community Club to Metro regarding the club's general goals and criteria for evaluation of various proposals for expansion of wastewater treatment plants. The comprehensive set of goals and criteria were developed to evaluate alternatives and impacts on geology (views, aesthetics, shoreline access, shoreline alterations), water resources (excavation runoff and leachate, effluent re-use potential, outfall location, impacts on biota), air quality (odor, dust, other air pollutants), energy and natural resources (effluent and sludge re-use, methane recovery), ecosystems (treatment plant impacts on wildlife, effluent impacts on aquatic biota), unique features (business activity, social and economic impacts, park and recreational use, project compatibility with other land uses), health and safety (hazardous chemicals, vandalism or sabotage, dispersal by air or water), social and cultural factors (employment, plant location, recreation), political and institutional considerations (community advisory group, distribution of wastewater facilities), demography (neighborhood stability), economy (cost, cost-effectiveness, inflation impacts, indirect costs, displacement costs, water dependence of certain businesses), land use (compatibility with Seattle Comprehensive Plan and 2000 Goals), environmental quality and aesthetics (human and other impacts, aesthetics, noise, lighting and glare, air and water quality), and area planning and projected growth (compatibility). These criteria have been considered in the facilities planning and have been used (in a modified form) in the EIS evaluation.

A subsequent Clear Water Watch community workshop was held on June 8 in the Conference Room of the Center House at Seattle Center. Forty-nine citizens from the West Point area attended this meeting, the purpose of which was to assure that citizens' comments are included in the environmental analysis of the eight wastewater treatment alternatives. Although there was some discussion of the effects of the West Point treatment plant on West Point beaches, the primary issue of discussion was the economic repercussions of locating a new plant in the Interbay area.

The Salmon Bay Improvement Association, representing commercial interests in the Commodore Way area, presented a petition asking Metro to seriously consider the economic impact of building a sewage treatment plant in that area. It was pointed out that Commodore Way is a service and supply area for a great portion of the Alaskan fishing fleet and that there would be significant tax losses if this important commercial property were purchased by Metro. Concern was also expressed for the impacts of locating a sewage treatment plant at the Commodore Way site on homes and neighborhoods in the Magnolia area. The number of people which would be adversely affected by a Commodore Way plant should be determined. Fear was also expressed for the odors which would be released by excavating the Golf Park site (previously a garbage dump). It was requested that Metro consider the advantages of undergrounding whatever plant is finally decided on for West Point/Interbay in order to control treatment plant odors. It was pointed out that effluent from an Interbay plant would harm Puget Sound just as much as a West Point plant. The feasibility, costs, and impacts of abandoning the West Point plant should be included in the environmental analysis.

There was some discussion of the need to protect the recreational value of West Point beaches. Opinions differed as to whether or not there had ever been clamming at West Point. Another concern expressed was about the impact on fish and water quality from residual chlorine in the effluent. Questions were asked about the feasibility of reclaiming West Point as a saltwater beach. It was suggested that funds from the Bureau of Outdoor Recreation be used to finance restoration of West Point to park status, and it was asked if Metro could use EPA money to enhance the shoreline as a mitigation measure. One citizen explained that he believes the historic lighthouse is now threatened by changing erosion/deposition patterns caused by Metro development at West Point. Questions were asked regarding the feasibility of reducing the West Point load, and the benefits this could have on West Point beaches. It was also requested that Metro investigate the costs of removing the sludge lagoons. Other points raised included the social obligation to obey the federal law requiring secondary treatment, the advantages of locating a secondary plant at the present West Point site, the high cost of purchasing/construction at Commodore Way, and the need to develop a new alternative maximizing CSO control and secondary treatment. The need to investigate water reclamation/energy recovery was mentioned as was the importance of not encouraging growth. Among other concerns voiced were the needs to treat industrial toxicants at the source, to allow West Point to return to its native condition, and to investigate lateral drift on South Beach. All items in the Magnolia Community Club letter were again stressed, as were the legal ramifications of the Seattle Shorelines Master Management program. The relative monthly user charges in Alternatives F & G were questioned, and Metro was requested to detail the costs per component of each alternative so that subcombinations among alternatives could be compared. The wisdom of reviewing recent advances in waste treatment systems in Europe and Japan was mentioned. An interesting comment was made that Seattle should take advantage of the federal funding for secondary treatment provided under PL 92-500 now.

If Seattle continued with primary treatment, but at some time in the future realized the need to advance to secondary, federal funds would probably not be available. Another concern raised was the importance of preventing interceptors installed to control CSO's from attracting or stimulating new growth.

In another example of citizen involvement in the planning process, letters from businesses in the Commodore Way area pledging support of the Salmon Bay Association were forwarded to Metro. Most of these letters stress the importance of the Commodore Way enterprises to the fishing fleet which docks in that area. It is pointed out that because of the specialized nature of these businesses, there is no other place in Seattle for them to relocate. The letters express concern that if a particular firm is not directly displaced, the odors from the new plant would make business unprofitable. It is believed that if the fishing support services were displaced, the fleet itself would leave Seattle. The resulting loss in tax revenue, income, and tourist attraction would be "disastrous" for Seattle, according to many of the letters.

A formal public hearing on the West Point Draft EIS is planned for the Fall of 1977. Comments will be incorporated into the Final EIS, for which one public hearing for West Point and other alternatives within the Metro planning area is scheduled for March, 1978.

It should be noted here that site-specific comments to date from citizen and agency involvement on the West Point or alternative facilities location have been considered in developing this Draft EIS (Volume II) for West Point. All regional or system-wide issues have been handled similarly in the Regional Draft EIS which is Volume I of this series.

APPENDIX A

ELEMENTS OF THE ENVIRONMENT

WAC 197-10-442 SPECIAL CONSIDERATIONS REGARDING CONTENTS OF AN EIS ON A NON-PROJECT ACTION. (1) The requirements of WAC 197-10-440 apply to the contents of a draft EIS on a proposal for a non-project action. Lead agencies, however, have greater flexibility in their approach to achieving compliance with the requirements of WAC 197-10-440 in writing an EIS for non-project actions, because normally less specific details are known about the proposal and any implementing projects, as well as the anticipated impacts on the environment.

(2) The lead agency should be alert to the fact that it is in the development and review of proposals for non-project actions where the range of alternatives is typically more broad than that of a proposal for a project action (which is often narrowed to a specific location and design). The proposal should be described in a manner which encourages consideration of a number of alternative methods of accomplishing its objective. For example, an objective of an agency's proposal should be stated as "the facilitation of the movement of people from point A to point B" rather than "the widening of an urban arterial in order to accommodate additional privately-owned passenger vehicles."

WAC 197-10-444 LIST OF ELEMENTS OF THE ENVIRONMENT. (1) Every EIS shall have appended to it a list of the elements of the environment in subsection (2), (3) and (4) of this section. The lead agency shall place "N/A" ("not applicable") next to an item when the proposal, including its indirect impacts, will not significantly affect the area (or subarea) of the environment in question. Items marked "N/A" need not be mentioned in the body of the EIS. Subsections (2) and (3) of this section correspond in subject matter to the questions contained in the environmental checklist used for threshold determination, and the questions in the checklist may be used to interpret this outline listing.

(2) ELEMENTS OF THE PHYSICAL ENVIRONMENT.

(a) Earth.
(i) Geology.
(ii) Soils.
(iii) Topography.
(iv) Unique physical features.
(v) Erosion.
N/A (vi) Accretion/avulsion.

(b) Air.
(i) Air quality.
(ii) Odor.
(iii) Climate.

(c) Water.
N/A (i) Surface water movement.
(ii) Runoff/absorption.

(iii) Floods.
(iv) Surface water quantity.
(v) Surface water quality.
N/A (vi) Ground water movement.
(vii) Ground water quantity.
N/A (viii) Ground water quality.
N/A (ix) Public water supplies.

(d) Flora.
(i) Numbers or diversity of species.
(ii) Unique species.
(iii) Barriers and/or corridors.
(iv) Agricultural crops.

(e) Fauna.
(i) Numbers or diversity of species.
(ii) Unique species.
(iii) Barriers and/or corridors.
(iv) Fish or wildlife habitat.

(f) Noise.

N/A (g) Light and glare.

(h) Land use.

(i) Natural resources.
(i) Rate of use.
(ii) Nonrenewable resources.

(j) Risk of explosion or hazardous emissions.

(3) ELEMENTS OF THE HUMAN ENVIRONMENT.

(a) Population.

N/A (b) Housing.

(c) Transportation/circulation.
(i) Vehicular transportation generated.
N/A (ii) Parking facilities.
N/A (iii) Transportation systems.
N/A (iv) Movement/circulation of people or goods.
N/A (v) Waterborne, rail and air traffic.
(vi) Traffic hazards.

(d) Public services.
N/A (i) Fire.
N/A (ii) Police.
N/A (iii) Schools.
(iv) Parks or other recreational facilities.
N/A (v) Maintenance.
N/A (vi) Other governmental services.

(e) Energy.
(i) Amount required.
(ii) Source/availability.

(f) Utilities.
(i) Energy.
N/A (ii) Communications.
N/A (iii) Water.
(iv) Sewer.
(v) Storm water.
(vi) Solid waste.

(g) Human health (Not including mental health)

(h) Aesthetics.

(i) Recreation.

(j) Archeological/historical.

(4) The following additional element shall be covered in all EISs, either by being discussed or marked "N/A," but shall not be considered part of the environment for other purposes:

N/A (a) Additional population characteristics.

(i) Distribution by age, sex and ethnic characteristics of the residents in the geographical area affected by the environmental impacts of the proposal.

WAC 197-10-446 DRAFT EIS--OPTIONAL ADDITIONAL ELEMENTS--LIMITATION. Agencies in their guidelines may add to the list in WAC 197-10-444 additional elements covering social, cultural and/or economic issues. Such additional elements shall become part of the environment for EIS purposes, and not otherwise. The guidelines of the lead agency shall control the content of the EIS, even though other agencies with jurisdiction are involved in the proposal. No agency shall prescribe additional material for an EIS beyond that which is required or optionally allowed by WAC 197-10-440 and -444, or which is added to the elements of the environment by the guidelines of the lead agency pursuant to the authority in this section [see WAC 197-10-440(14)].

PUBLIC AWARENESS, HEARINGS AND CIRCULATION OF DRAFT EIS

WAC 197-10-450 PUBLIC AWARENESS OF AVAILABILITY OF DRAFT EIS. (1) Upon publication of the draft EIS, the responsible official shall list the proposal in the lead agency's "EIS Available Register" maintained at the agency's SEPA public information center.

(2) The lead agency is encouraged, but not required, to use any reasonable method calculated to inform the public of the availability of the draft EIS and of the procedures for requesting a public hearing. Examples of such methods are publication of notice in a newspaper of general circulation in the county, city or general geographic area where the proposal is located; notifying private groups that are known to be interested in a certain proposal; contacting news media personnel and encouraging news coverage; and, placing notices in appropriate regional, neighborhood or ethnic periodicals.

APPENDIX B

REFERENCES

See Regional Analysis EIS, Volume I, Appendix A for references.